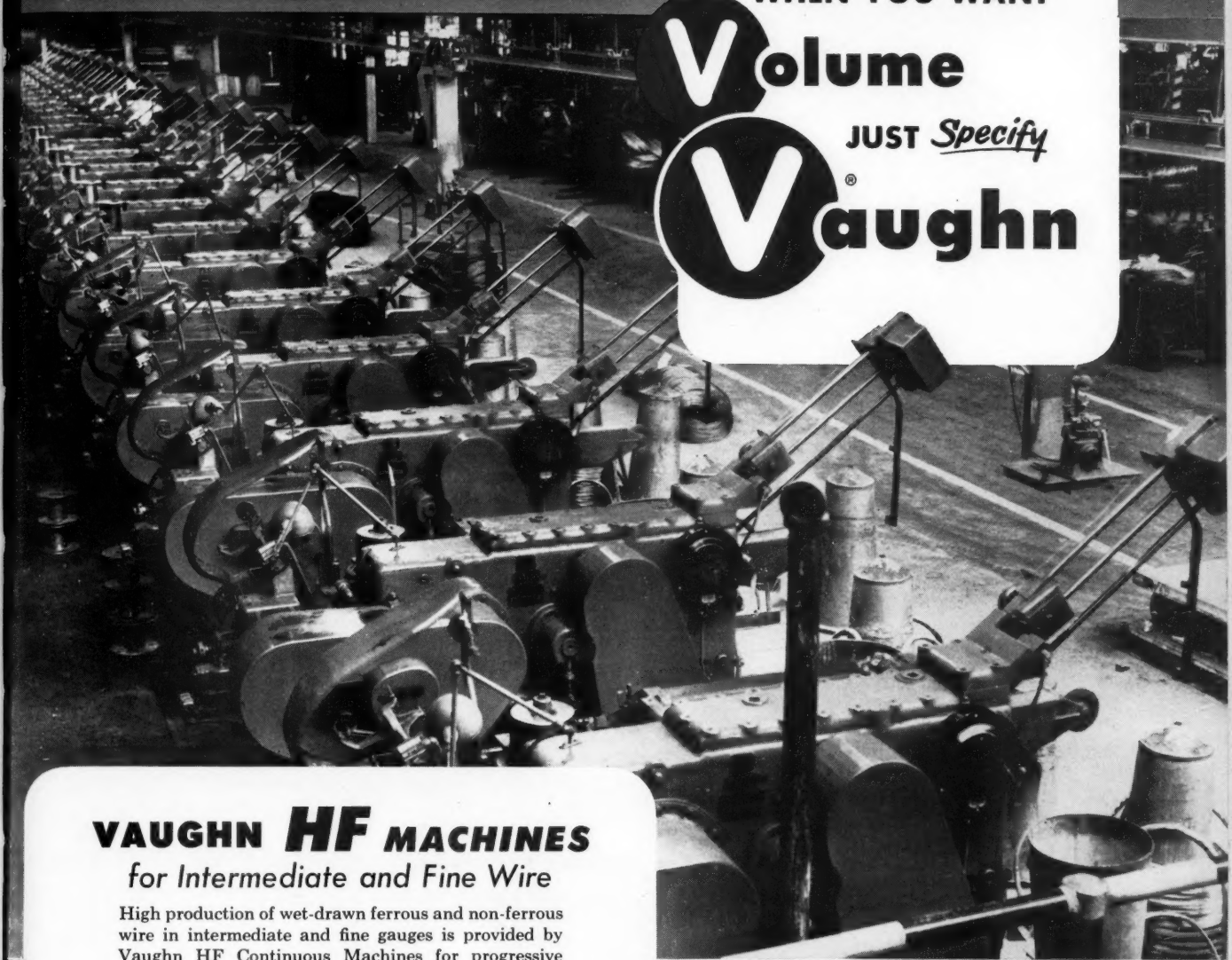
APRIL 1955

WIRE AND WIRE PRODUCTS



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Cuyahoga Falls, Ohio, U. S. A.

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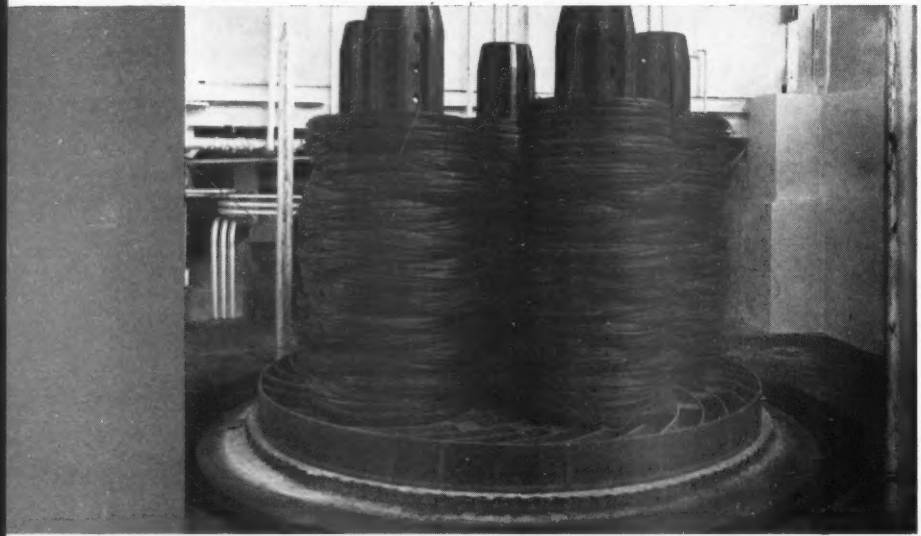
OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

SUPER BELL TYPE ANNEALING FURNACES BOOST ROD and WIRE PRODUCTION — IMPROVE QUALITY

Largest diameter circular radiant tube annealing furnace in operation today was recently started up at one of the nation's foremost rod and wire manufacturers. It consists of three huge 108" furnaces and five bases. This same concern has more of these on order.



Five stacks of 34" diameter coils after annealing. The furnace is large enough for three stacks of 48" diameter rod coils.

Big 108" diameter furnaces that will hold three stacks of 48" diameter rod coil were recently set into operation by one of America's leading rod and wire makers to step up production of these new larger coils. Designed and built by Lee Wilson, the nation's foremost manufacturer of radiant tube, bell type annealing furnaces, the units are the largest of their kind in commercial production today.

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If you process wire or rod, you'll want the full story of these big, modern, high production units. Simply write Lee Wilson Engineering and a qualified Lee Wilson engineer will call on you at your convenience.

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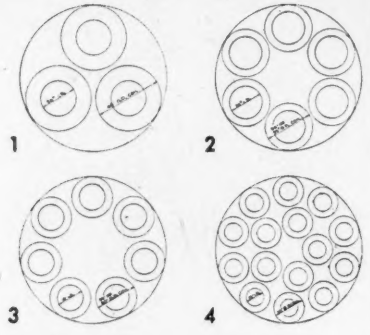
CHARGE VERSATILITY is emphasized by these typical loading patterns. Regardless of coil size, you can take full advantage of this 108" diameter base.



TABLE

Load	Coil Size	No. Stems per Charge	Weight per Stem	Total Charge (Lbs.)
No. 1	Rods (48")	3	6000	18,000
No. 2	26" Block 35" OD x 24" ID	6	4500	27,000
No. 3	22" Block 29" OD x 19" ID	7	4500	31,500
No. 4	16" Block 22" OD x 13" ID	15	2500	37,500

Lee Wilson

ENGINEERING COMPANY, Inc.

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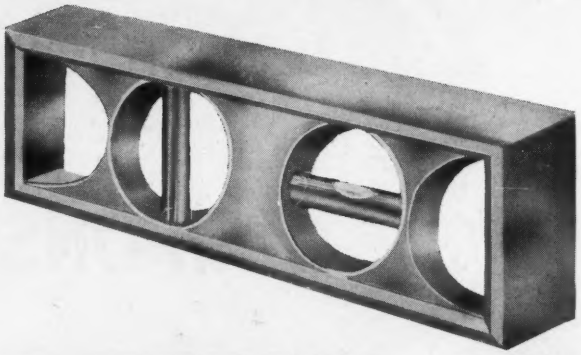

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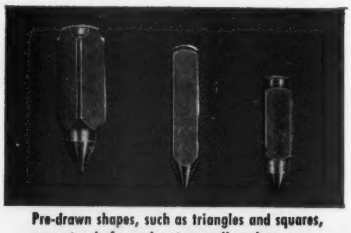
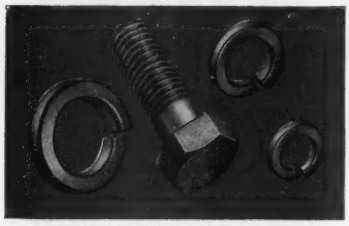
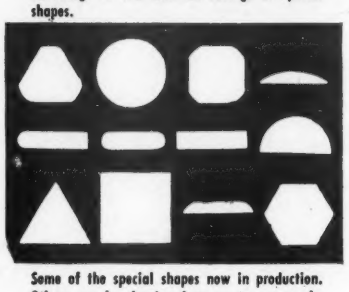


Pre-drawn shapes, such as triangles and squares, are naturals for carburetor needle valves.



Hex-head bolts and flat-wire lock washers take advantage of the material savings of special shapes.



Some of the special shapes now in production. Others can be developed to meet your needs.

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Improve Product Performance

Alloy Special Wire Shapes eliminate costly machining time and cut metal waste. No need to start with round wire and then machine half of it away to get the shape you want. Alloy Metal Wire Division is ready to supply you with Stainless and Nickel Alloy wire in just about any special shape you may require. Some of the standard shapes available are shown here. We will be more than willing to work with you in the development of any other shape.

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Quality and Low Cost

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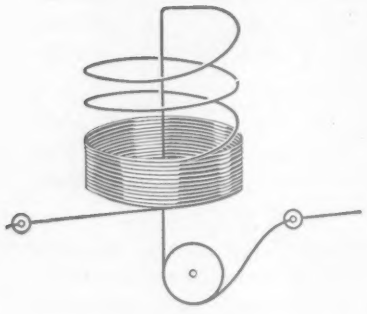

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DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 30 April, 1955 No. 4

Designated as Official Publication By The Wire Association

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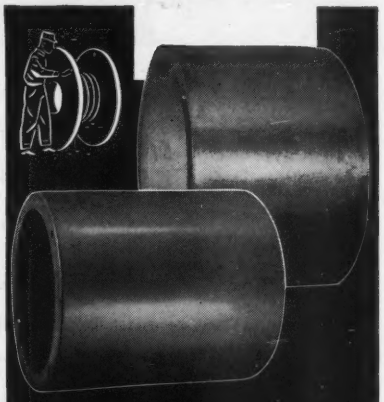

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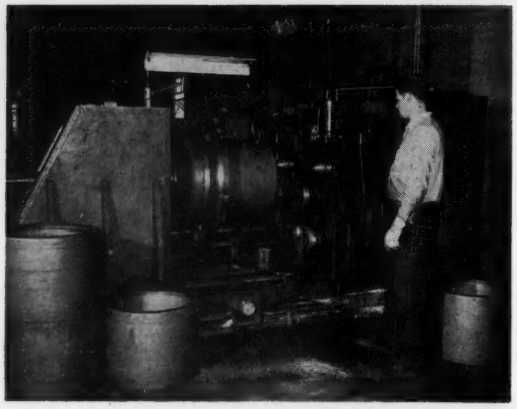

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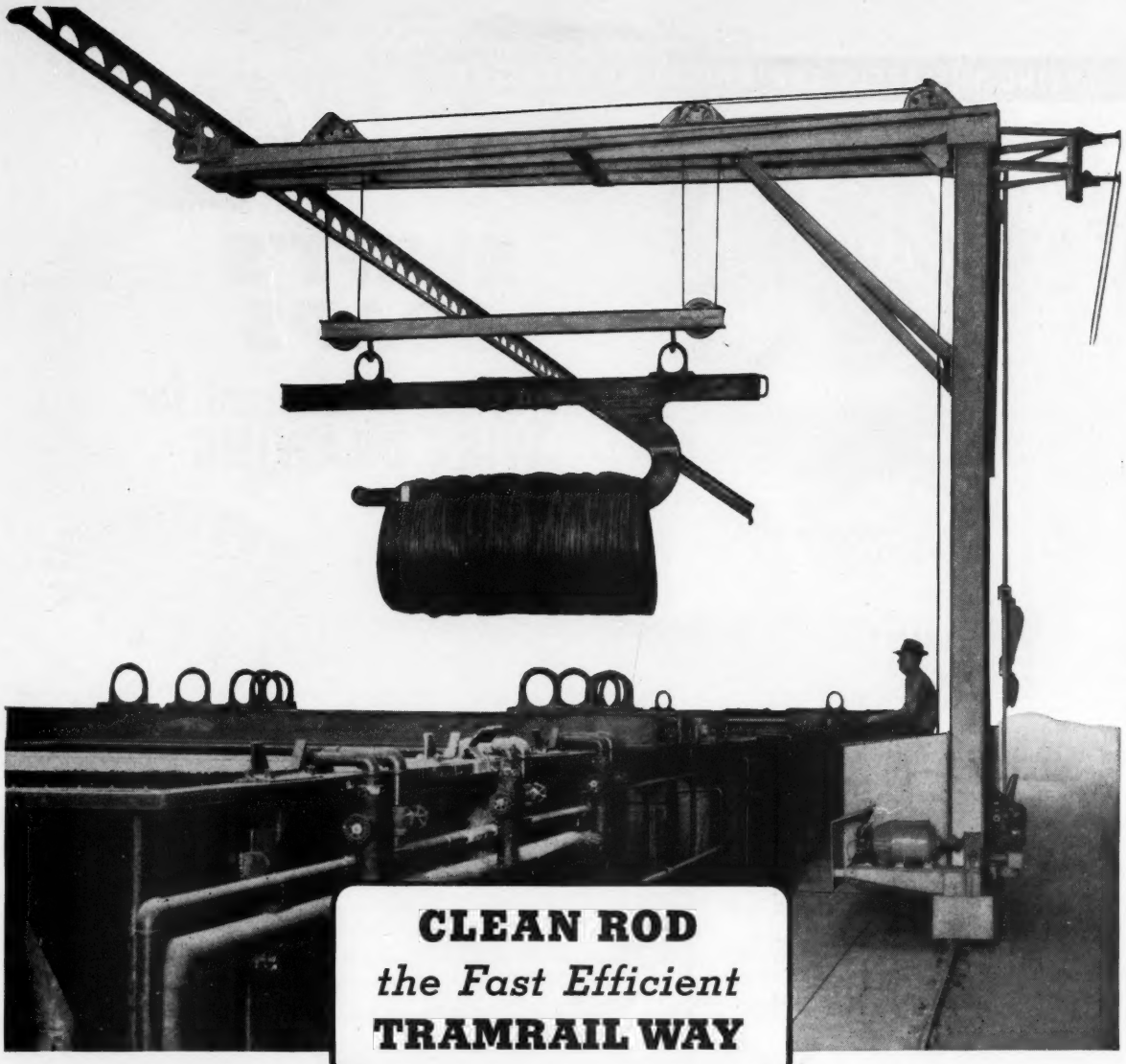

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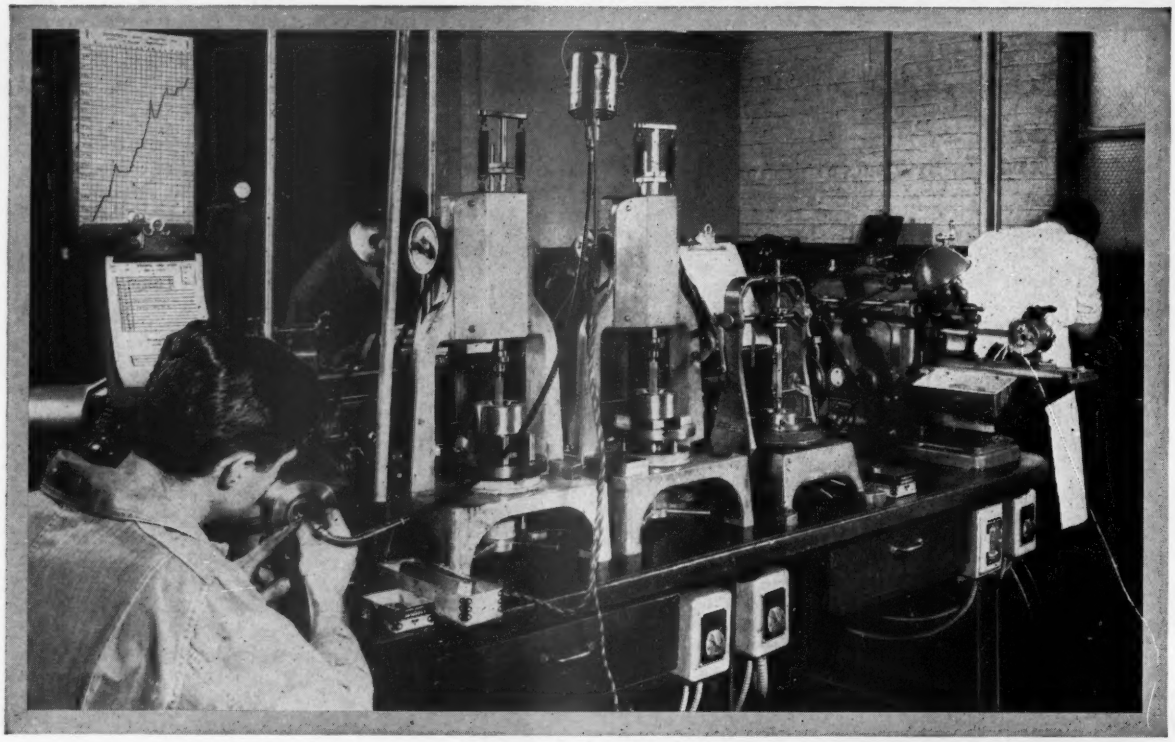

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ELGIN NATIONAL WATCH COMPANY

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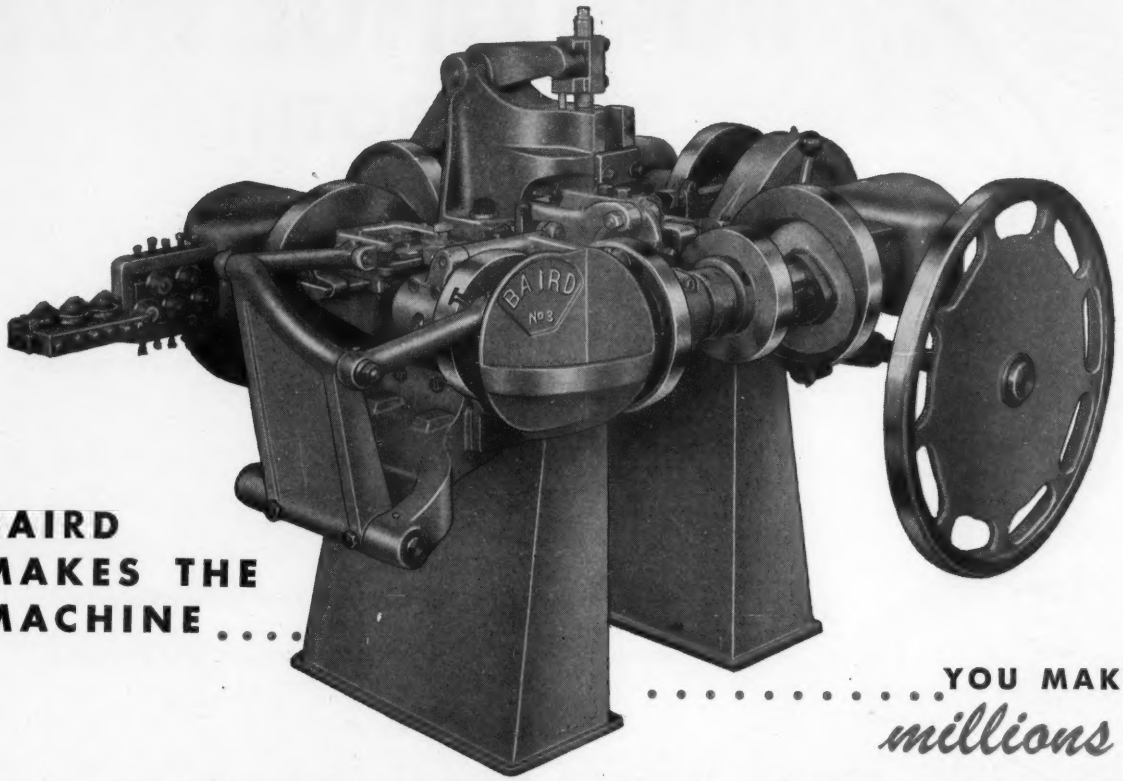

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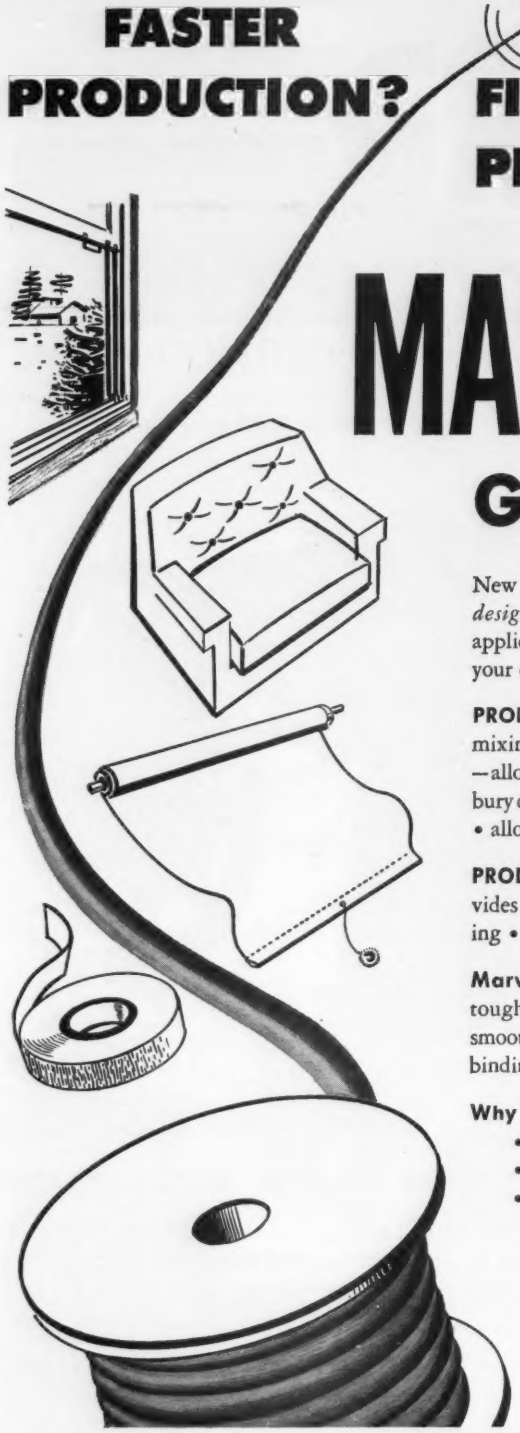

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- window channels and panel trim?
- tough upholstery?
- primary insulation and cable jackets?
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- electrical tape?

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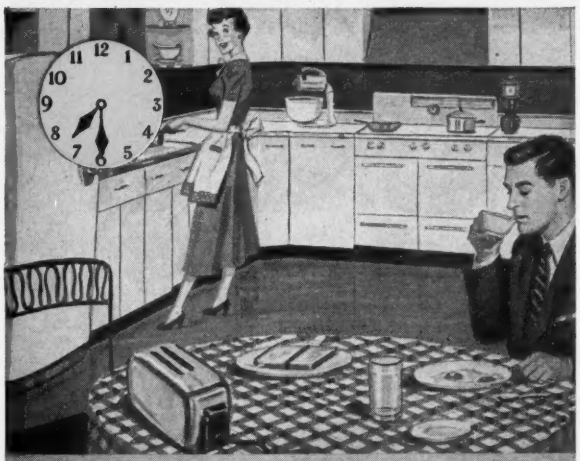
Naugatuck Chemical is an original sponsor of the new Vinyl Film Standard of Quality Program.

round the clock with CF&I-WICKWIRE WIRE

Let's take a look at a typical day in the life of John Q. Citizen—and of the part CF&I-Wickwire Wire plays in his every-day activities.

7:00 A.M.—BEDROOM. John's day starts with the ringing of his alarm clock. There's wire in the mattress and bedspring. In the lampshades and drapery hooks. Bobby pins, safety and common pins in his wife's dressing table—to mention just a few.

7:15 A.M.—NURSERY. Here's the crib from which young John helps the alarm clock to rouse his dad. No less than nine different kinds of wire go into its making. His toys and his tricycle, too—even the zippers on his clothes make use of CF&I-Wickwire Wire.



7:30 A.M.—KITCHEN. Let's inspect the kitchen. In the range and the refrigerator there are wire racks. The kitchen utensils, wire strainers, electric mixer, the egg slicer, the toaster, and dozens of other appliances all use CF&I-Wickwire Wire in their construction.

FOR THE WIRE YOU REQUIRE CHECK CF&I-WICKWIRE

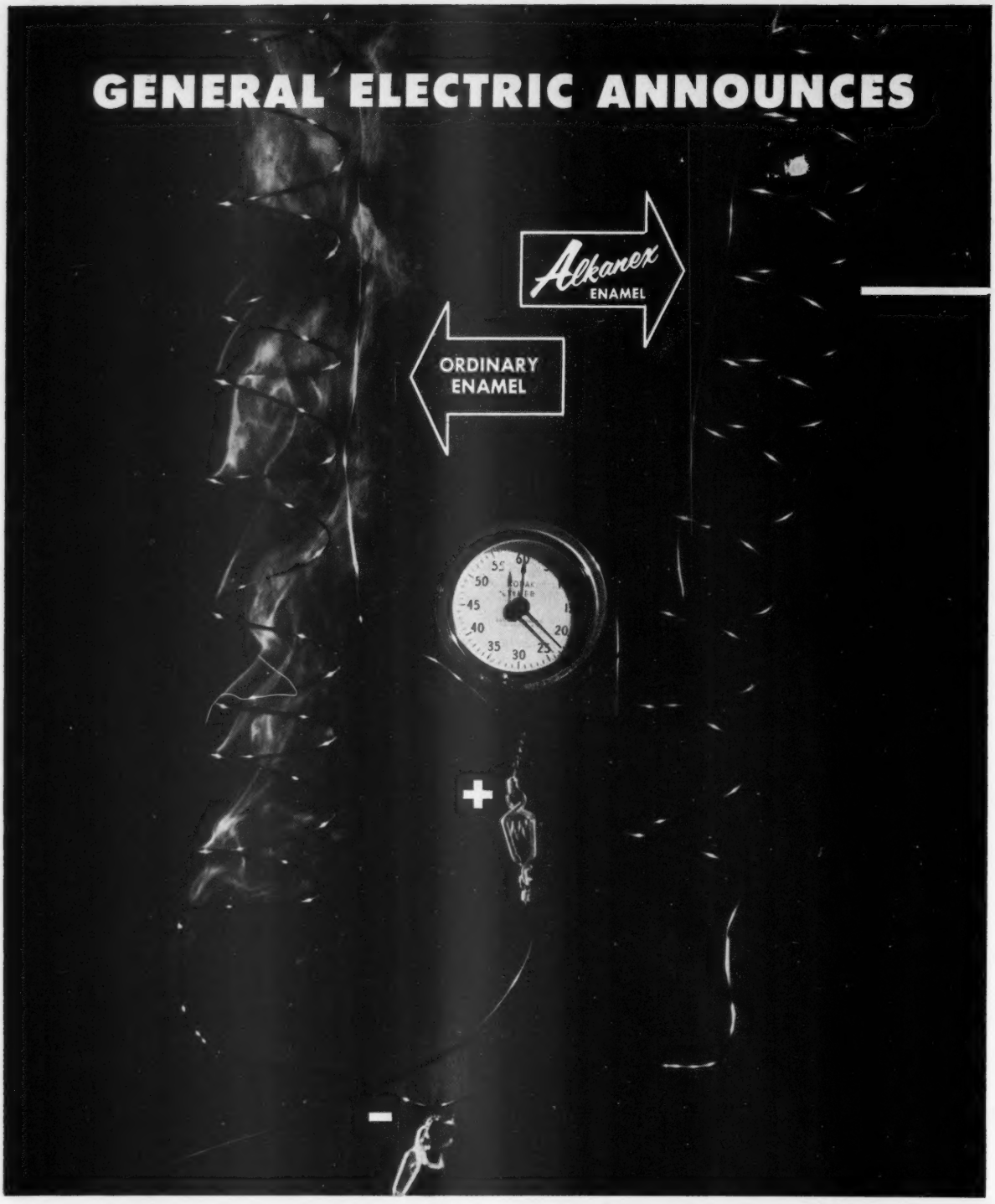
Watch for the balance of John's day in succeeding advertisements that take him to his office, through his plant and finally home to his living room.

CF&I-WICKWIRE WIRE

2846

THE COLORADO FUEL AND IRON CORPORATION

WICKWIRE SPENCER STEEL DIVISION—Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans • New York • Philadelphia • THE COLORADO FUEL AND IRON CORPORATION—Albuquerque • Amarillo Billings • Boise • Butte • Denver • El Paso • Ft. Worth • Houston • Lincoln (Neb.) • Los Angeles • Oakland • Oklahoma City • Phoenix • Portland • Pueblo • Salt Lake City • San Francisco • Seattle • Spokane • Wichita



HERE'S A VISUAL DEMONSTRATION OF HEAT RESISTANCE!

In this laboratory test, arranged to demonstrate the heat-resistance of Alkanex enamel compared with conventional enamel, two coils of magnet wire were simultaneously grounded in a dead "short circuit," producing temperatures on the surface of the wire considerably *in excess of 250 C.* In less than 20 seconds the coil on the left, coated with conventional enamel, began to smoke and in approximately 45 seconds the enamel coating had disintegrated. At that point the coil of wire on the right, coated with Alkanex enamel, had barely begun to smoke even though the wire temperature greatly exceeded the normal limits for Alkanex enamel.

Alkanex WIRE ENAMEL

NEW INSULATING ENAMEL WITH

UTSTANDING HEAT-RESISTANT QUALITIES
XCELLENT DIELECTRIC AND MECHANICAL PROPERTIES

General Electric is proud to introduce ALKANEX wire enamel—an insulating enamel whose outstanding properties include the ability to withstand temperatures of 175 C for a limited time and at least 150 C in continuous service.

By using wire coated with Alkanex enamel, equipment can be designed with far greater latitude in temperature limitations. Overload protection can be readily increased; and, thanks to better aging properties, phase and turn insulation can conceivably be eliminated in smaller motors and coils. Higher-temperature equipment, which previously required bulkier insulated magnet wire may now be able to take advantage of space-saving enameled wire.

In short, Alkanex wire enamel facilitates the design of equipment for greater compactness, operation at higher temperatures, and longer life, thus permitting increased ratings for any given frame size—in other words, "MORE POWER PER POUND!"

Naturally, we'll be glad to send you salient details on this new wire enamel that combines excellent mechanical and dielectric properties with an *increase of 35-40 C* in operating temperature limits. Just write to *General Electric Co., Chemical Materials Dept., Sect. 513-1C, Bldg. 77, Schenectady 5, N. Y.*

"More Power per Pound"...with

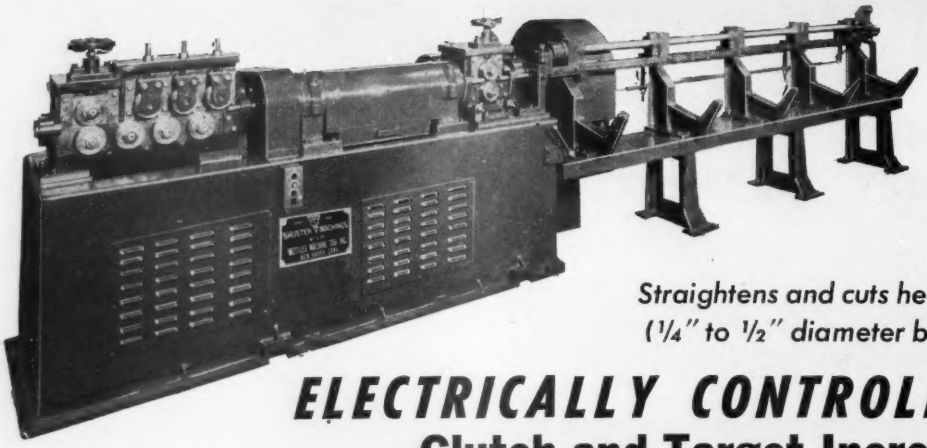
INSULATING MATERIALS

sulating varnishes and wire enamels • Silicone resins • Varnished paper and cloth
Mica products • Electrical-grade laminates

Progress Is Our Most Important Product

GENERAL ELECTRIC

MOVE INTO THE *Automation Age* *with the* NEW SHUSTER 3A!



Straightens and cuts heavy stock (1/4" to 1/2" diameter basic wire)

ELECTRICALLY CONTROLLED Clutch and Target Increase Efficiency and Production

NOW get highest SHUSTER production plus electrically controlled Clutch and Target! Advanced SHUSTER designing improves efficiency of operation and minimized waste. Send for complete details!

OUTSTANDING FEATURES:

- Instantaneous clutch and cut-off cam
- Lightning cut-off knife for clean, true, square-cut ends
- Ball and roller bearings throughout
- V-Belt motor drive for quiet, efficient operation
- Preliminary Straightener: The feed rolls and the lower breaking rolls are gear driven, and mounted on Timken Roller Bearings. The upper breaking rolls are not gear driven, but are mounted on anti-friction bearings. This device removes the natural curve of the coil and rough straightens the wire before it enters the rotary flier to be made perfectly straight.
- 5-Die Straightening Flier. Highspeed drive creates high production standards.

SHUSTERS are available for .025" to 11/16" diameter wire: shapes, flat stock, tubing. Write us your requirements.

Representatives in all principal cities.

Send for free, wall-size, split-gauge wire chart, from 41 gauge to 7/0.

SHUSTER

SINCE 1866

METTLER MACHINE TOOL, INC.

155 West Adeline St., New Haven, Conn. New York Office: 11 Broadway, WH 4-5480

HOTEL
COMMODORE
NEW YORK, N.Y.

NAME Apex Alkali
ADDRESS Main & Rector
CITY Philadelphia

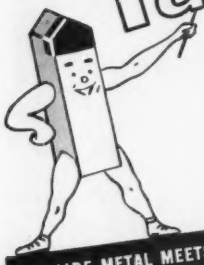
WE'RE CHECKING IN
FOR THE REGIONAL
MEETING AND WE HOPE
TO SEE YOU THERE!

Whether to just say "Hello" or to solve some real problems, it will be fine to have you visit us.

April 28 and 29
Welcome

APEX ALKALI PRODUCTS COMPANY
Lubricants & Cleaning Compounds for Wire and All Wire Products
Main and Rector Streets · Philadelphia 27, Pa. · IV 3-3939

Talide ROLLS double production of your mill



TALIDE METAL MEETS EVERY REQUIREMENT

SOLID BAR STOCK

DRAWING DIES

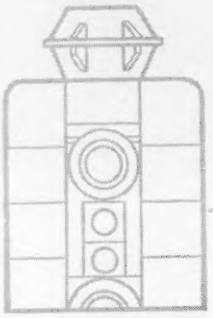
CENTERLESS BLADES

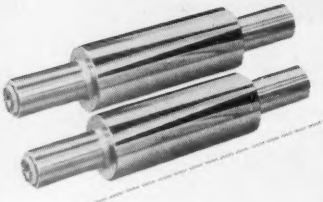
DRILL JIG BUSHINGS

DIAMOND PRODUCTS

Send for New 84-Page Catalog 54-G or Ask for Sales Engineer to Call.

Metal Carbides Corp., Youngstown 7, Ohio

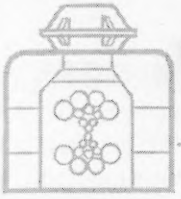


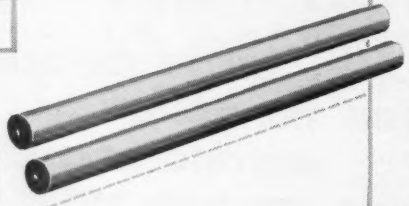


Solid Carbide Rolls for 4-High and Cluster-Type Mills.

1600 to 20 coils

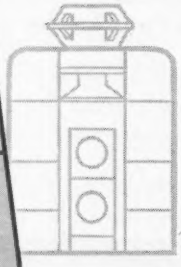
LARGE PITTSBURGH STRIP STEEL PRODUCER reports rolling 1600 coils of low carbon, high carbon, stainless and alloy steel strip with Talide rolls before same needed regrinding. Best previous service life obtained with steel rolls averaged between 16 and 20 coils.

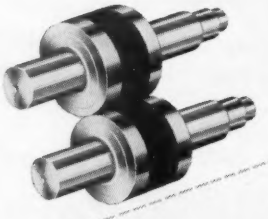




168 to 7 hours

LEADING OHIO STRIP STEEL PRODUCER averages 750 coils of various types and analysis between grinds, enabling them to operate their cold rolling mill continuously without roll changes for 7 days, 3 turns per day. Previous steel rolls used averaged 6-8 hours, necessitating 3 or 4 roll changes per day with considerable down-time.





Sleeved Rolls for Flat Wire Mills.

50 to 2 coils

LARGE STEEL PRODUCER of straight chrome and nickel-chrome stainless steel strip now operates continuously for 3 turns or more with Talide rolls, whereas with steel rolls it was necessary to change 7 or 8 pair per turn. 50 coils are now rolled per regrind compared to 2 coils with steel rolls.

METAL CARBIDES CORPORATION

MC TALIDE

YOUNGSTOWN 7, OHIO

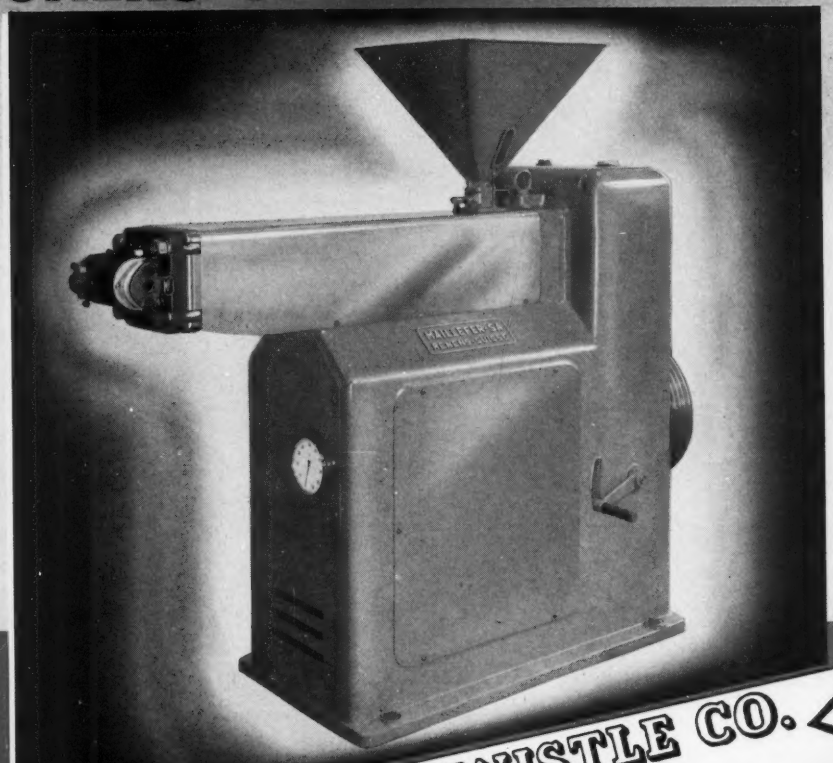
SINTERED CARBIDES · HOT PRESSED CARBIDES

HEAVY METAL · CERMETS · HIGH TEMPERATURE ALLOYS

OVER 25 YEARS' EXPERIENCE IN TUNGSTEN CARBIDE METALLURGY

JLE

DESIGNERS OF WIRE MACHINERY



JAMES L. ENTWISTLE CO.

PLANT and EXECUTIVE OFFICE:
1475 ELMWOOD AVE., CRANSTON (PROV. 7), R.I., U.S.A.

A HIGH PRODUCTION MACHINE FOR EXTRUSION OF PLASTICS, NYLON AND SIMILAR MATERIALS

FEATURING:

- DRIVE incorporating forced lubrication, with overload clutch; ball and thrust bearings used throughout.
- HELICAL gears of carbon steel, avoid as much as 20% power loss due to frictional heat inherent in conventional worm gear drives.
- HEAD easily dismounted, clean pocketless flow-lines avoid decomposition of materials.
- CYLINDER of ground and lapped special steel for long life; easily removed.
- HEATING automatically controlled and maintained at constant temperature in independent sections.

ASK FOR CATALOG 9B.

Get Production, Economy, Quality with J&L Cold Heading Wire

More and more profit-conscious wire users are turning to J&L for Cold Heading Wire that helps them get increased production, top quality and operating economy. They've found that J&L furnishes wire with—

- **High Plastic Deformation**
- **The Right Finish**
- **High Cold Malleability**
- **The Utmost Uniformity**

. . . in other words cold heading wire that consistently has the right chemical and physical properties.

The dependability of J&L Cold Heading Wire is the result of quality control from ore to finished product, rigid testing, modern equipment and over a hundred years of iron and steel-making experience.

Contact J&L and investigate the economies of using J&L Cold Heading Wire in your operation. Remember, it's tops in quality—competitive in price.

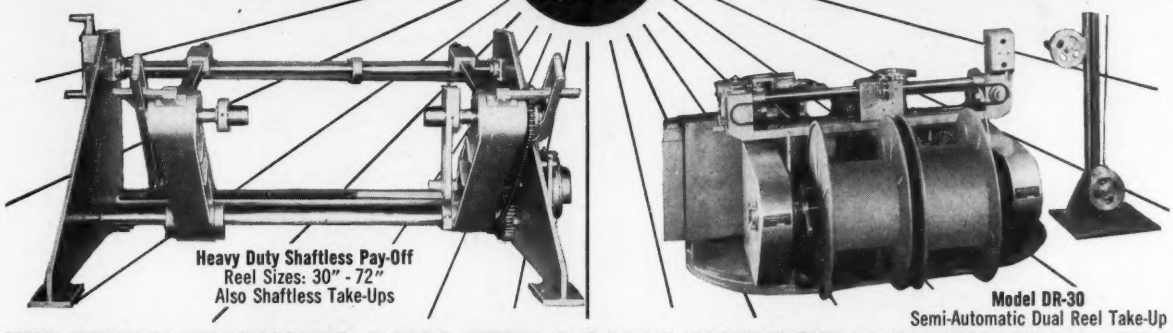
Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

Model T-30
Take-Up or Re-Reeler

No. 4 Spark Tester
Automatic Resparking for Re-Reeling

CV Type Sparker
For Continuous Vulcanizing
or Plastic Extruding

FOR ACCURACY DAVIS WIRE & CABLE EQUIPMENT FOR DEPENDABILITY



Heavy Duty Shaftless Pay-Off
Reel Sizes: 30" - 72"
Also Shaftless Take-Ups

Model DR-30
Semi-Automatic Dual Reel Take-Up

THE NEWLY REDESIGNED *DAVIS WIRE & CABLE EQUIPMENT* IS BETTER THAN EVER

Modernized, streamlined and engineered for fast production of safely insulated wire and cable, the newly redesigned DAVIS ELECTRIC line of Spark Testers, Pay-Offs, Take-Ups, Counters, Spoolers, Traverses and Capstans is now offered as the finest ever conceived and produced by DAVIS ELECTRIC engineers. Before you buy, you owe it to your pocketbook as well as your business reputation to learn what this unexcelled machinery can do to better satisfy your customers (and your stockholders!). Refinements and advancement in designs qualify the 1955 DAVIS ELECTRIC line to surpass in performance previous DAVIS products in use in 80% of the industry's wire mills and some of which have been in operation for 15 years without maintenance problems!

What better tribute to quality can one ask?

Write for complete details and find out how DAVIS ELECTRIC can improve your wire and cable production and promote profit in your plant.

Davis ELECTRIC CO.

WALLINGFORD, CONN., U.S.A.

DAVIS WIRE & CABLE EQUIPMENT

HARNESS TESTERS ★ PAY-OFFS ★ TRAVERSES
SPARK TESTERS ★ SPOOLERS ★ TAKE-UPS ★ CAPSTANS

Correspondents throughout the world

Foreign Sales Representatives: OMNI PRODUCTS CORP. 460—4th Avenue, New York 16, New York

HIGH QUALITY

fiber glass yarns for wire and cable insulation

Pittsburgh Fiber Glass yarns are made of exceptionally uniform continuous filaments, twisted and plied for any desired buildup. They are packaged for use with all standard types of serving and braiding machinery.

Pittsburgh yarns have proved their high quality with numerous manufacturers. If you have not yet put them to your tests, you are invited to make arrangements through our executive or district sales offices. Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.

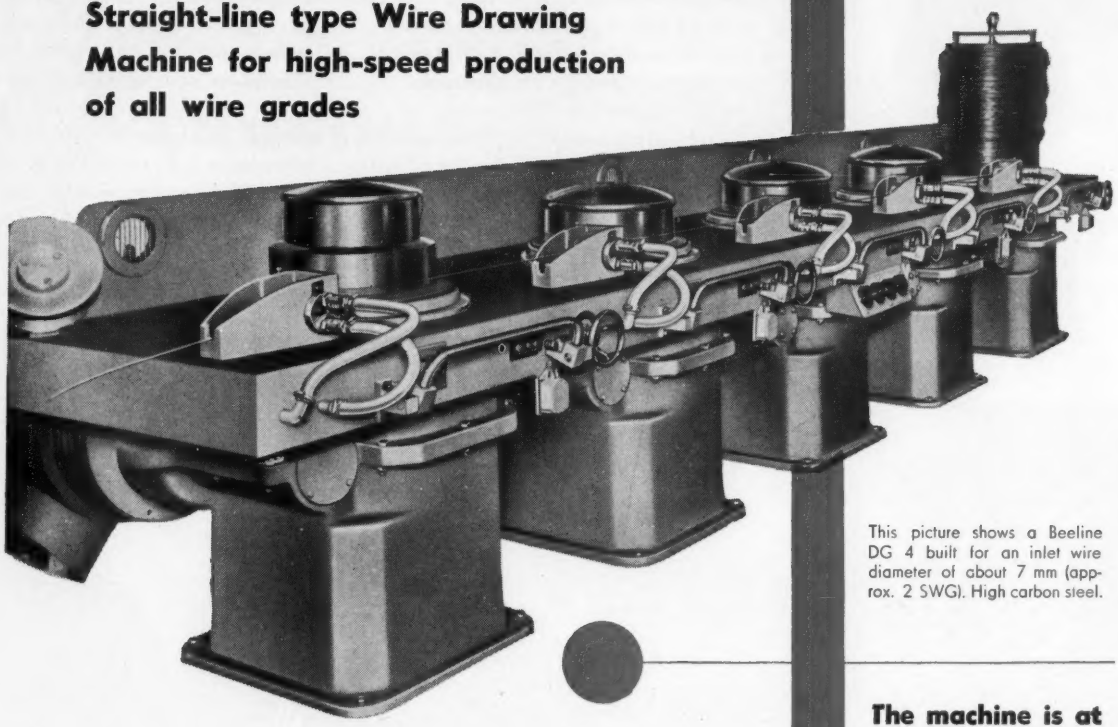
FIBER PG GLASS

PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS

PITTSBURGH PLATE GLASS COMPANY

THE BEELINE WIRE DRAWING MACHINE

Straight-line type Wire Drawing Machine for high-speed production of all wire grades



This picture shows a Beeline DG 4 built for an inlet wire diameter of about 7 mm (approx. 2 SWG). High carbon steel.

Prominent Beeline features:

- Complete absence of slipping between wire and block.
- Direct block-to-block wire running, with automatic speed control and no loops or other mechanical adjusting devices.
- Continuous speed adjustment from almost zero up to maximum.

Let us help you solve your problems. We shall be glad to answer your questions promptly. Don't forget to let us know what wire is to be drawn, the inlet and finished diameter, its intended use, the production required, and all other relevant information (tensile strength of the finished wire etc.). Then we can suggest a machine that is just right for you.

The machine is at present manufactured in three different sizes:

BEELINE DG 5:
for heavy wire, about 13 mm. (7/0 SWG)

BEELINE DG 4:
for wire rods, about 7 mm. (2 SWG)

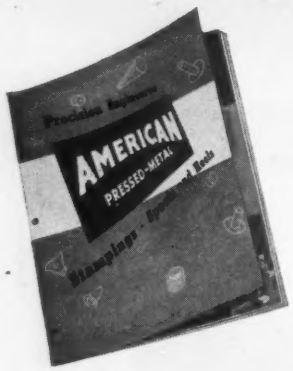
BEELINE DM 3:
for wire with an inlet diameter of about 3 mm. (11 SWG)

MH

MORGÅRDSHAMMAR

MORGÅRDSHAMMARS MEK VERKSTADS AB • MORGÅRDSHAMMAR • SWEDEN

Cables: Morgårdshammar, Ludvika. Tele: 0240–71100



Send for your free copy of our latest bulletin on American Pressed-Metal Spools and Reels. It contains full details and charts on the many standard types.

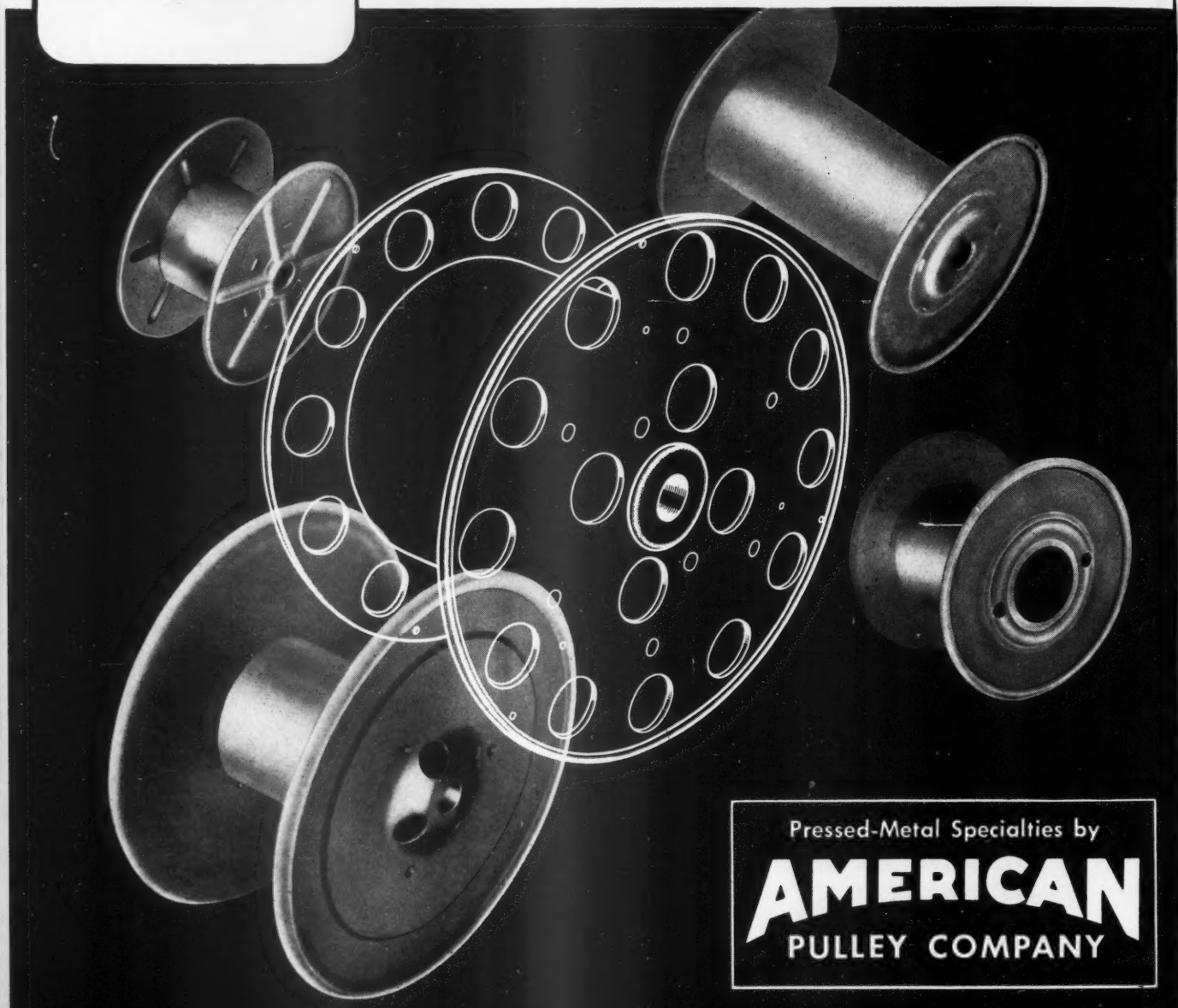
For shipping or processing spools and reels get exactly what you want from American Pulley

Name your need . . . there's an American pressed-metal reel or spool to meet it. And if our long list of standard sizes doesn't contain the model you need, we'll custom-build one to your exact requirements.

American pressed-metal spools and reels are practically indestructible—won't crack, chip or warp. They offer the added advantages of light weight, cleanliness and strength.

Almost 60 years' experience in design and manufacture—plus a vast assortment of tools, dies and other facilities for making all types of spools and reels to strict custom specifications—are at your service.

Send us your specifications, blueprints or merely tell us what you need and we'll design from scratch. You'll find our quotations fast, realistic and offering you good value for the money. The American Pulley Company, 4242 Wissahickon Ave., Philadelphia 29, Pa.



Pressed-Metal Specialties by

AMERICAN

PULLEY COMPANY

CRUCIBLE FINE STAINLESS WIRE...

now available — all sizes... all tempers

Users of fine wire can now obtain prompt delivery of Crucible stainless steel wire . . . in all diameters . . . in all tempers from full hard to dead soft. And Crucible's fine wire comes in all standard grades — with a bright surface or a variety of metallic and nonmetallic finishes tailored to meet your specific application.

Our new fine wire mill is equipped with the latest facilities for annealing, pickling, drawing and finishing. Our mill metallurgical control setup is the latest word, too, to assure you that every spool and coil produced conforms to Crucible's high standard of quality — dimensional, physical and surface uniformity that is unsurpassed in the industry.

No matter what type of wire you use — whether it be cold heading wire, weaving wire, spring wire, needle wire, screen wire, cable wire, or a host of other types — our new mill is equipped to serve you. For prompt delivery of quality stainless wire, call your nearest Crucible warehouse.

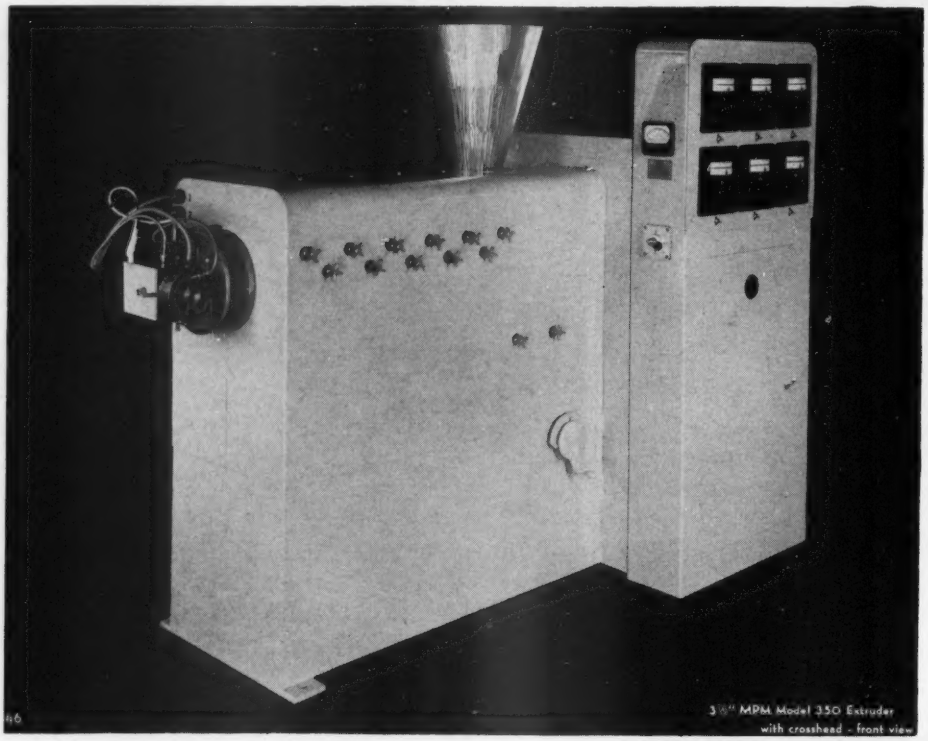
CRUCIBLE first name in special purpose steels

STAINLESS STEEL WIRE

CRUCIBLE STEEL COMPANY OF AMERICA, GENERAL SALES OFFICES, OLIVER BUILDING, PITTSBURGH, PA.

"Modern" INSULATING EQUIPMENT

is designed for those electric wire manufacturers who demand the best in extruders.



Shown at left: 3½" MPM Model No. 350 Extruder with crosshead, front view.

MPM Extruders are used by nearly all material suppliers, by laboratories for quality testing, and for production. One large electric wire manufacturer now has 17 MPM Extruders-reorders for them indicate the satisfaction they give.

MPM Extruders have the utmost flexibility and will handle a wide range of compounds and cross sections, as they are equipped with the best in temperature controls.

Literature upon request with questionnaire to determine the sizes, types and production requirements. MPM equipment is used in all principal foreign countries, indicating flexibility with many compounds.

Complete line of accessory equipment, such as dual take-ups, capstans, spark testers, measuring units etc.

MODERN PLASTIC MACHINERY CORP.

15 UNION STREET • LODI, NEW JERSEY, U.S.A.

Telephone GRegory 3-6218

CONTINUOUS WIRE PATENTING, PICKLING AND COATING LINE

by DREVER

Installed in the plant of
John A. Roebling's Sons Company
Trenton, N. J.

Line Consists of

GAS-FIRED, MUFFLE TYPE HEATING FURNACE
GAS-FIRED IMMERSION TUBE HEATED LEAD QUENCHING BATH
COOLING ROLLS
ACID PICKLE TANK
HOT WATER SPRAY RINSE TANK
COATING TANK

CAPACITY, 3000 LBS./HOUR
HIGH CARBON STEEL WIRE
12 STRANDS 0.112" AVERAGE DIA.

Automatic Controls • Can be Electrically Heated
Substantial Savings in Labor Costs!
High Quality Products

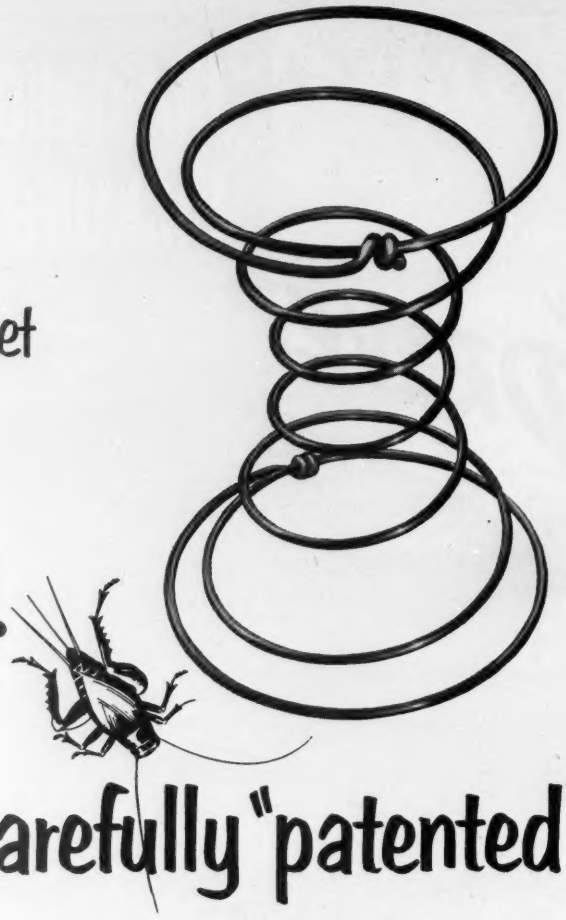
Send your inquiries and requirements for equipment to our competent staff of engineers and metallurgists

DREVER COMPANY
RED LION RD. & PHILMONT AVE. • BETHAYRES, PA.

Livelier

than a

cricket



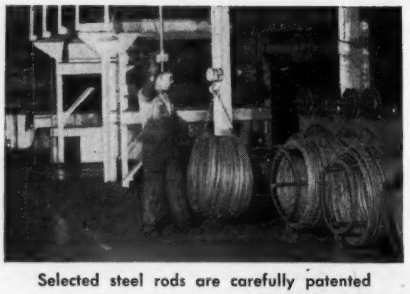
because it's carefully "patented"

Silver Star is a special-purpose spring wire that's engineered for a variety of upholstery applications. It coils and knots beautifully because it's so amazingly uniform in its properties and so true to gage.

One reason is the careful way we carry out the "patenting," the heat-treatment we give to selected steel rods before we draw them through dies into wire. This vital step helps to assure the proper strength, resiliency and other properties so necessary for making lively springs.

We'd be happy to ship you a trial lot of Silver Star in the gage and temper you specify. And after you've given it a full test in your own plant, be prepared to discover that it's as good as — or most likely, that it's better than — any you've used before!

And we wouldn't be surprised if you asked us to begin shipping Silver Star to you regularly. (It's happened that way before.) For full details just phone or write the nearest Bethlehem Steel sales office.



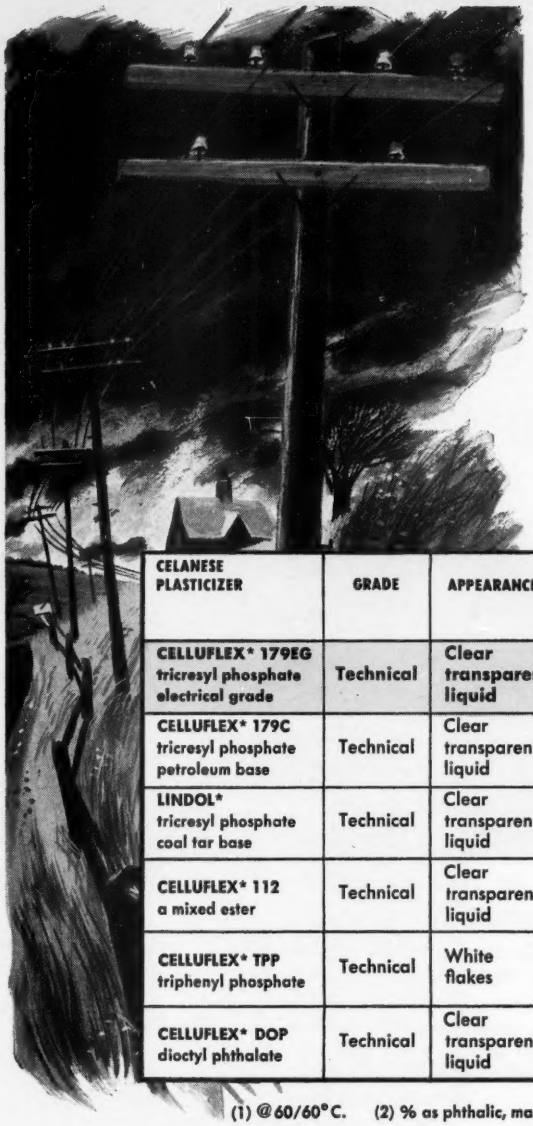
Selected steel rods are carefully patented before we draw them through dies into wire.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Celanese® CHEMICALS

PLASTICIZER



RECOMMENDED

CELLUFLEX* 179 EG

FOR

WIRE INSULATION

WHY

WEATHER RESISTANCE

DESCRIPTIVE DATA

CELANESE PLASTICIZER	GRADE	APPEARANCE	COLOR APHA Max.	SPECIFIC GRAVITY @20/20°C.	ACIDITY	ESTER VALUE % Min.	PERMANGANATE TIME, Min. (In Minutes)	REFRACTIVE INDEX @ $n\frac{20°C.}{D}$
CELLUFLEX* 179EG tricresyl phosphate electrical grade	Technical	Clear transparent liquid	150	1.145 ± .005	0.01 (3)	99	30	1.552 (5)
CELLUFLEX* 179C tricresyl phosphate petroleum base	Technical	Clear transparent liquid	150	1.165 ± .005	0.01 (3)	99	30	1.553 (5)
LINDOL* tricresyl phosphate coal tar base	Technical	Clear transparent liquid	75	1.165 ± .005	0.01 (3)	99	30	1.556
CELLUFLEX* 112 a mixed ester	Technical	Clear transparent liquid	40	1.210 ± .005	0.01 (3)	99	30	1.560 (5)
CELLUFLEX* TPP triphenyl phosphate	Technical	White flakes	20 (4)	1.221 (1)	0.003 (3)	99	30	1.550 (6)
CELLUFLEX* DOP dioctyl phthalate	Technical	Clear transparent liquid	50	0.985 ± .002	0.01 (2)	98	—	1.4859

(1) @ 60/60°C. (2) % as phthalic, max. (3) % as phosphoric, max. (4) Molten (5) @ $n\frac{25°C.}{D}$ (6) @ $n\frac{60°C.}{D}$

Where weather and high volume resistivity are major considerations, Celluflex 179 EG is the specified plasticizer. 179 EG (electrical grade tricresyl phosphate) imparts excellent resistance to weathering and maintains high insulation value in vinyl wire and cable coverings.

Celanese is an expanding source of plasticizers for many jobs. Bulk stocks at convenient distribution points are ready to meet tight schedules. Combination shipments — Celanese Plasticizers and Solvents or Intermediates — yield an extra dividend in price differential and freight savings. Be on our mailing list for new plasticizer developments. Please drop a card to Dept. 590-D, Celanese Corporation of America, Chemical Division, 180 Madison Avenue, New York 16, N.Y.

*Reg. U. S. Pat. Off.

Celanese® CHEMICALS

your

SPECIFICATIONS

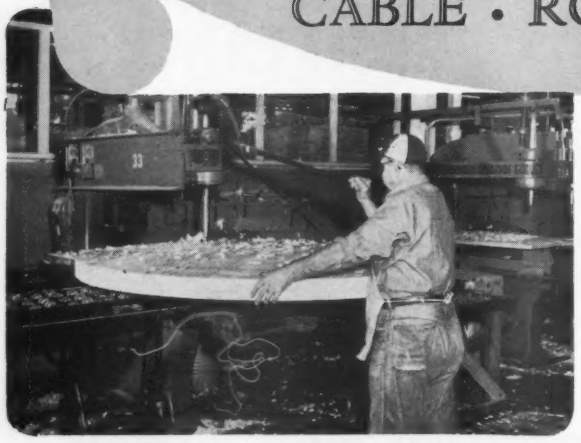
are our

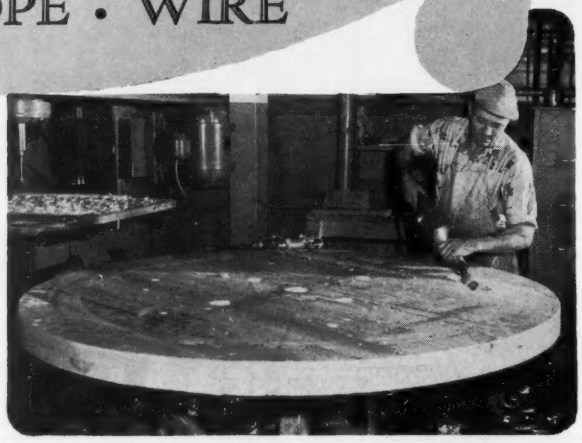
BLUEPRINTS for...

Quality WOOD REELS

for

CABLE • ROPE • WIRE





EVERY type of WOOD REEL, Returnable or Non-returnable, for the WIRE INDUSTRY . . . from 10" to 10' in Diameter.

STRAIGHT-LINE production methods and extensive facilities produce precision-made REELS of highest Quality at prices that make it good business to buy from BRIDGE.

A completely MODERN plant, with the very BEST and FASTEST equipment, much of it specially designed for us, assures you of rapid SERVICE and TOP QUALITY REELS.

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SHIPPING SERVICE in our... OWN TRUCKS

within a radius of 200 miles from the plant. Fast freight will bring you Bridge reels in 5 days or less east of the Mississippi.

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MANUFACTURING COMPANY

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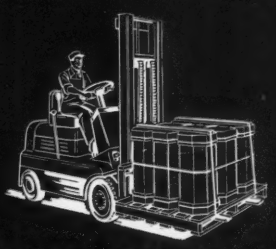
"REAL GOOD..."

Let us quote on your reel needs. Send your specifications. Better yet, visit our plant and see how and why our reels are made so well at so low a cost.

WOOD REELS"



Roebling drum packs are shipped on pallets unless otherwise specified. This gives you today's easiest, least expensive method of moving and stacking wire —with a fork truck, one man can do the work of ten.

Packed to save you money!

IN ADDITION to producing top quality high carbon wire, Roebling has developed many special methods of packing ... and some *one* of these, or some other method which may be developed for your specific requirements, may save a considerable amount of time and money in your plant.

Certain types of wire, for instance, can be packed in hexagonal fibre drum packs that provide superior protection and facilitate handling and storing wire. Drum packs do not have to be returned ... save you bother, storage space and freight charges.

You *pay* for the best when you buy high carbon wire. Make sure you *get* the best, in wire and packing too. Always specify Roebling. John A. Roebling's Sons Corporation, Trenton 2, N. J.

ROEBLING

Subsidiary of The Colorado Fuel and Iron Corporation

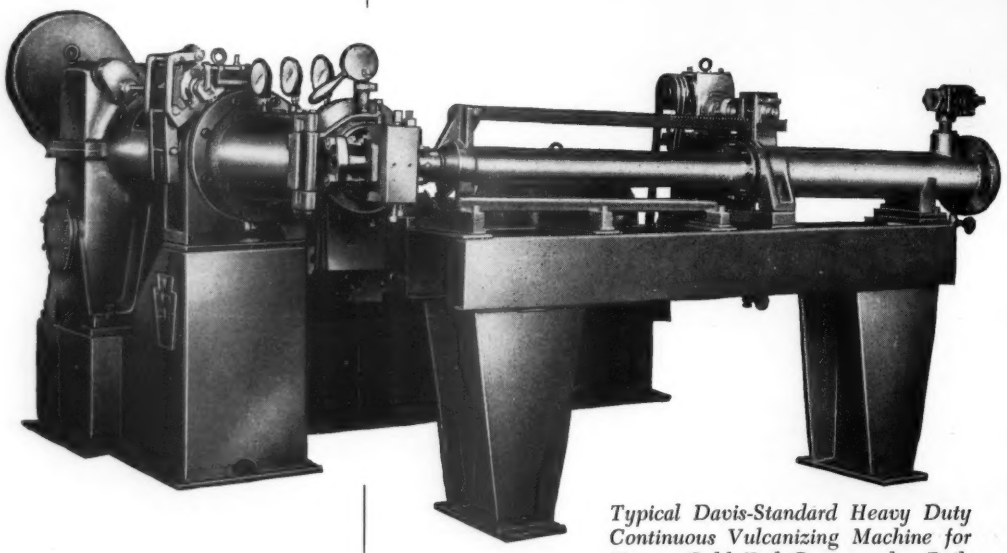
ATLANTA, 934 AVON AVE • BOSTON, 51 SLEEPER ST & 5 PITTSBURGH ST • CHICAGO, 5525 W. ROOSEVELT RD • CINCINNATI, 3253 FREDONIA AVE • CLEVELAND, 13225 LAKEWOOD HEIGHTS BLVD. • DENVER, 4801 JACKSON ST • DETROIT, 915 FISHER BLDG • HOUSTON, 6216 NAVIGATION BLVD • LOS ANGELES, 5340 E. HARBOR ST • NEW YORK, 19 RECTOR ST • ODESSA, TEXAS, 1920 E. 2ND ST • PHILADELPHIA, 230 VINE ST • ROCHESTER, 1 FLINT ST • SAN FRANCISCO, 1740 17TH ST • SEATTLE, 900 1ST AVE S. • ST. LOUIS, 3001 DELMAR BLVD • TULSA, 321 N. CHEYENNE ST • EXPORT SALES OFFICE, TRENTON 2, N. J.

If you wish, Roebling spools will be delivered on pallets with separators, providing the easiest and most economical means of handling and stacking wire with fork trucks.

Teamwork Often Makes the Difference

Give your rubber-insulated wire the extra quality that results from coordinated teamwork. Davis-Standard continuous vulcanizing equipment — from pay-off to take-up — is designed and built to work as a team to produce the finest rubber insulation quickly and efficiently.

Demands for ever-faster production are being met by constant improvement of speed control. Split-second synchronization of extruder screw, capstan drums, and dual reel take-up assures that all units "pull together". The result is faster production, a better product, and less waste of material and man-hours.



Typical Davis-Standard Heavy Duty Continuous Vulcanizing Machine for Hot or Cold Fed Compounds. Built in 3¼", 4½", and 6" Bore Sizes.

The Davis-Standard complete wire line includes:

Self-Braking Pay-Offs	**Steam and Water Seals**
Drag Capstans	**Continuous Take-Ups**
Rubber Extruders	**Pulling Capstans**
Splice Boxes	**Dancer Control Columns**
Vulcanizing Tubes	**Wire Measuring Machines**

DS

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Sole selling agents for

THE STANDARD MACHINERY COMPANY

World's Largest Manufacturers of Custom-Built Extruding Machines

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IF YOU'RE looking for a broad line of aluminum wire that will meet your exact specifications on every count—call Kaiser Aluminum!

Our wire is of highest quality and includes round, manufacturers, hexagonal, rivet, welding, spooled fine, screen, and EC (electrical conductor grade) wire. All are in alloys, diameters and tempers for exacting mechanical and electrical applications. Redraw rod and wire is available for further drawing into finished products.

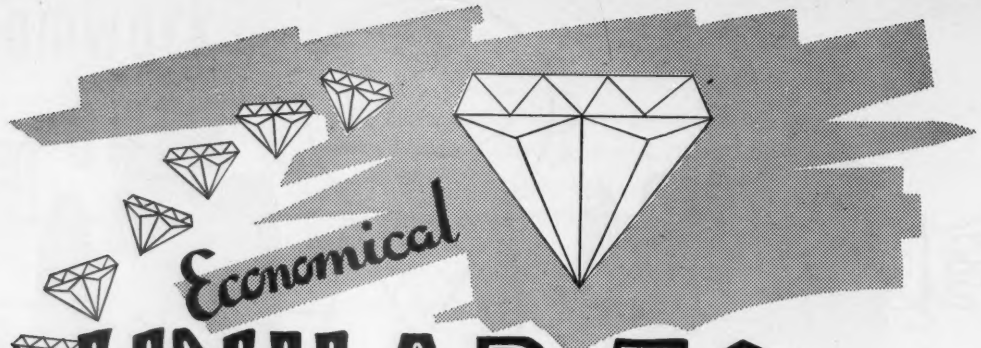
On all our wire, you get *fast* service and *dependable* delivery—perhaps better than you've ever had before!

Our efforts are put behind the job of serving *you*—and we are ideally equipped for the job. We operate the newest and most modern high production mill of its kind in the country. And we have expanded our national warehousing system, our distributor program and our staff of metallurgists and field engineers.

For immediate attention to your needs, contact Kaiser Aluminum Sales office listed in your telephone directory, or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office,* Palmolive Building, Chicago 11, Illinois; *Executive Office,* Kaiser Building, Oakland 12, California.

Kaiser Aluminum

setting the pace—in growth, quality and service



Economical

UNILAP-TC

A DIAMOND COMPOUND WITH MORE DIAMOND FOR LESS MONEY!
AND - WE TELL YOU HOW MUCH DIAMOND YOU ARE GETTING!

Why should there be so much mystery about how much diamond there is in the diamond compound you buy? We WANT you to know exactly what you get when you use UNILAP-TC:

UNILAP-TC: THE HIGHSPEED DIAMOND ABRASIVE

GRADE NO.	COLOR	CARATS OF DIAMONDS PER GRAM	PRICE PER GRAM
1	Ivory	.50	$2.00
3	Yellow	.90	3.25
6	Orange	1.15	3.75
8	Green	1.20	4.00
15	Blue	1.25	4.05
30	Red	1.75	5.70
45	Brown	1.75	5.70
230-325	Purple	1.50	4.85
170-230	Gray-Black	1.50	4.85

Supplied in 5 gram cartridges, 5 gram jars, 7 gram tubes and 18 gram cartridges.

UNILAP-TC is sold on a money-back guarantee. If you are not satisfied that UNILAP-TC provides more efficiency and economy than any other compound you have used, just return the unused portion for full credit.

For efficiency, for economy, try UNILAP-TC and compare!

Buying diamond compounds merely on the basis of "they work" is costing you a lot of money. No pig-in-a-poke is the UNILAP-TC compound — you know what you are buying and you are buying

The Best for Less

UNION WIRE DIE CORP.

MAIN PLANT 375 FAIRFIELD AVE., STAMFORD, CONN. - 71 WEST 45th. STREET, NEW YORK 19, N. Y.

For Your Plating File!

Why Big Savings Result When You Electro-tin Copper Wire with B&A Tin Fluoborate

The use of a Baker & Adamson Tin Fluoborate bath in electro-tinning copper wire results in a uniform, easily-controlled tin coating. Tin consumption is reduced more than two-thirds as compared with hot-dipped coatings.

Moreover, copper wire with a fluoborate-plated tin coating of 100 millionths of an inch may be readily drawn through dies for burnishing or for reduction in gage. For example, a plated No. 20 wire can be reduced to a No. 34 wire—a type of processing impractical with hot-dipped wire because of the structure of the coating and its non-uniformity.

The electroplated wire comes from the fluoborate bath with a fine grain coating that has a white matte color, excellent solderability, and good shelf life. The fluoborate bath has no fumes, requires no ventilation, and operation is fast and simple compared with alkaline baths. For full information, write for Baker & Adamson Technical Bulletin TC-43441, or call your nearest B&A office. *No royalties need be paid to use this process!*

REAGENTS B·A STANDARD OF PURITY FINE CHEMICALS

BAKER & ADAMSON® *Fine Chemicals*

GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

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10 Basic Advantages of B&A Fluoborate Baths

1. **No mixing or dissolving needed—supplied in concentrated form**
2. **Easier bath preparation**
3. **Stability of bath composition**
4. **Ease of control**
5. **Practically 100% anode and cathode efficiencies**
6. **High conductivity**
7. **Good covering power**
8. **Fine-grained deposits of good color**
9. **Fast, high-speed operation**
10. **Readily adaptable for lead-tin alloy deposits**

As with Tin Fluoborate in the electro-tinning operation described, other B&A Metal Fluoborates offer additional special advantages in particular operations. Profit by using them!

BAKER & ADAMSON PRODUCTS
GENERAL CHEMICAL DIVISION
Allied Chemical & Dye Corporation
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Free! Data sheets giving full information on lead and tin fluoborates plus Bulletin TC-43441 on electro-tinning of copper wire. Write today!

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Synthetic yarns of Viscose Rayon, Acetate Rayon, High Tenacity Cordura, Nylon, Dacron, Orlon and Fortisan, together with Purified Cotton (manufactured under Western Electric License), furnished you on Single or Multiple Wound Braider or Serving Tubes, in Standard packages.

Special Twisting, featuring knotless packages, is also done. We can supply all yarns in constructions and in packages to meet your exact specifications.

Cotton yarns in all sizes.

DYED YARNS ARE OUR SPECIALTY

Synthetic and cotton yarns treated for electrical applications.

WAXED LACING CORDS CORE YARNS

In fact, any yarn requirement for electrical insulation is either carried in stock or can be processed for you in our up-to-the-minute manufacturing facilities.

Write today for information.

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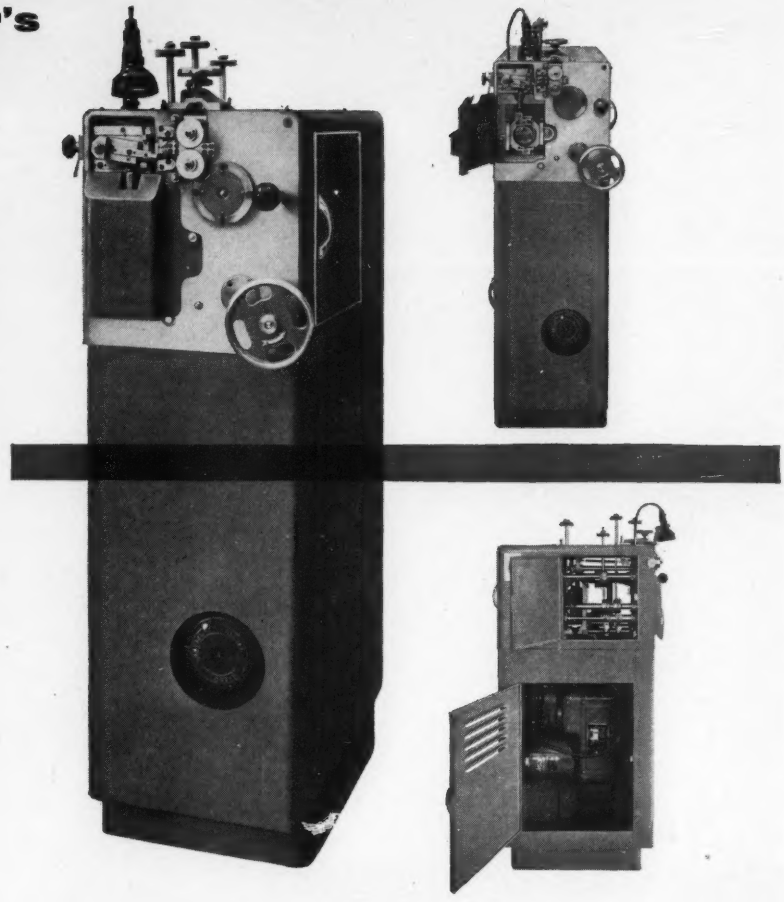
Springmaker's Delight!

.... Torrington's new W-10A

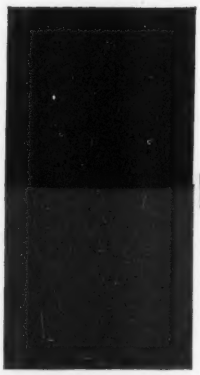
Based on the famous W-10 Spring Machine which has long been standard equipment throughout the industry, Torrington now offers the modernized W-10A Springmaker. This versatile, high-production machine includes many new features, all of which contribute to ease of set-up, correct location of controls, "clean" design and lower maintenance.

Read the specifications. Then call or write for further information on how the W-10A can be put to work in your plant to speed your production and reduce your costs.

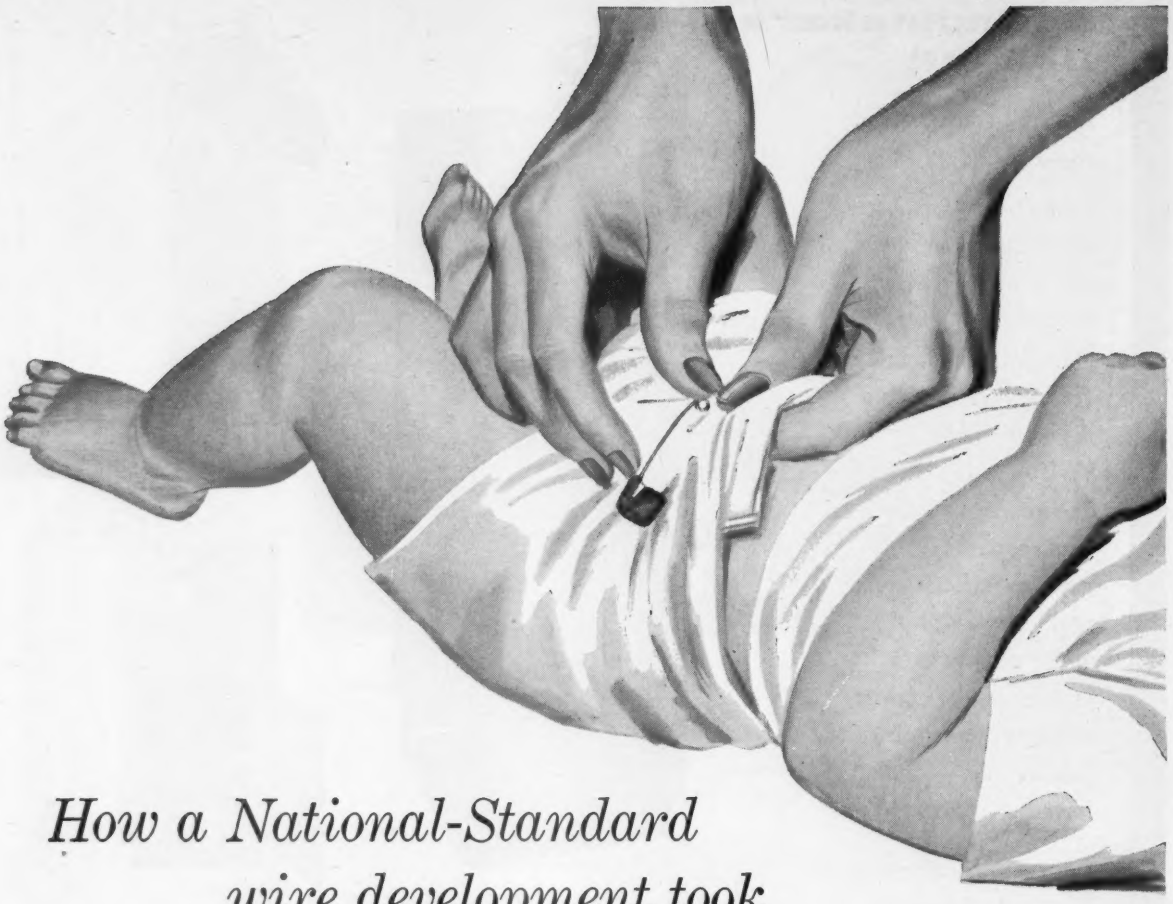


SPECIFICATIONS

Wire Diameter Range	.008" to .028"
Wire Length Per Spring	0" to 24"
Coil Range (O.D.)	$\frac{1}{16}$" to $\frac{7}{8}$"
Production	24 to 243 with motorized variable speed transmission 21 to 240 with electronic adjustable speed drive
Drives	½ HP motorized variable speed transmission ¾ HP electronic adjustable speed drive
Extra Wire Feed Gears	0" to 36" of .008 to .024 diameter wire 0" to 48" of .008 to .020 diameter wire
Special Wire Feeds	0" to 6½" (using standard wire feed gears reversed)
Attachments Available	Torsion spring coiling mechanism, double diameter spring control mechanism, continuous coiling, 10 roll—2 plane-quick-opening ball bearing straightener, 5 roll—single plane—quick opening ball bearing straightener
Floor Space	21" front x 28" deep
Wire Line Height	48"
Weight	695 lbs.



THE
TORRINGTON
MANUFACTURING COMPANY
TORRINGTON, CONNECTICUT



How a National-Standard wire development took

A BETTER "REEF" IN BABY'S PANTS

● Almost any product can be made better. Take safety pins.

A prominent manufacturer came to National-Standard with this idea: "Give us," he said, "a polished wire that needs no plating, yet won't corrode... a better, stronger, springier wire to which we can attach a plastic head."

A National-Standard research team took on the problem... and produced a special stainless steel wire with a mirror finish that needed no further polishing. They gave it magnetic properties so that bits of steel could be easily removed from the plastic compound used for heads . . . to protect costly dies and equipment. They gave it a special temper that made it springier, tougher, yet still easy to form.

Thousands of manufacturers have learned to depend on National-Standard for development and manufacture of special types of wire, wire cloth and strip steel . . . fussy, hard-to-make products that many companies hesitate to tackle. Why not give us a call and see what we can do for *you*.

NS NATIONAL-STANDARD Company NILES, MICHIGAN

NATIONAL-STANDARD COMPANY • NILES, MICHIGAN
Tire Wire, Stainless, Fabricated Braids and Tape
ATHENIA STEEL DIVISION • CLIFTON, N. J.
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WAGNER LITHO MACHINERY DIVISION • JERSEY CITY, N. J.
Special Machinery for Metal Decorating
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Round and Shaped Steel Wire, Small Sizes

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THE FOUR-IN-ONE CONTINUOUS BAR and ROD MAKING MACHINES

FROM A ROUGH COIL OF WIRE
TO STRAIGHTENED AND POLISHED BARS or RODS
BARS or RODS
Round, Square, Hexagon, Rectangular, Special Shapes
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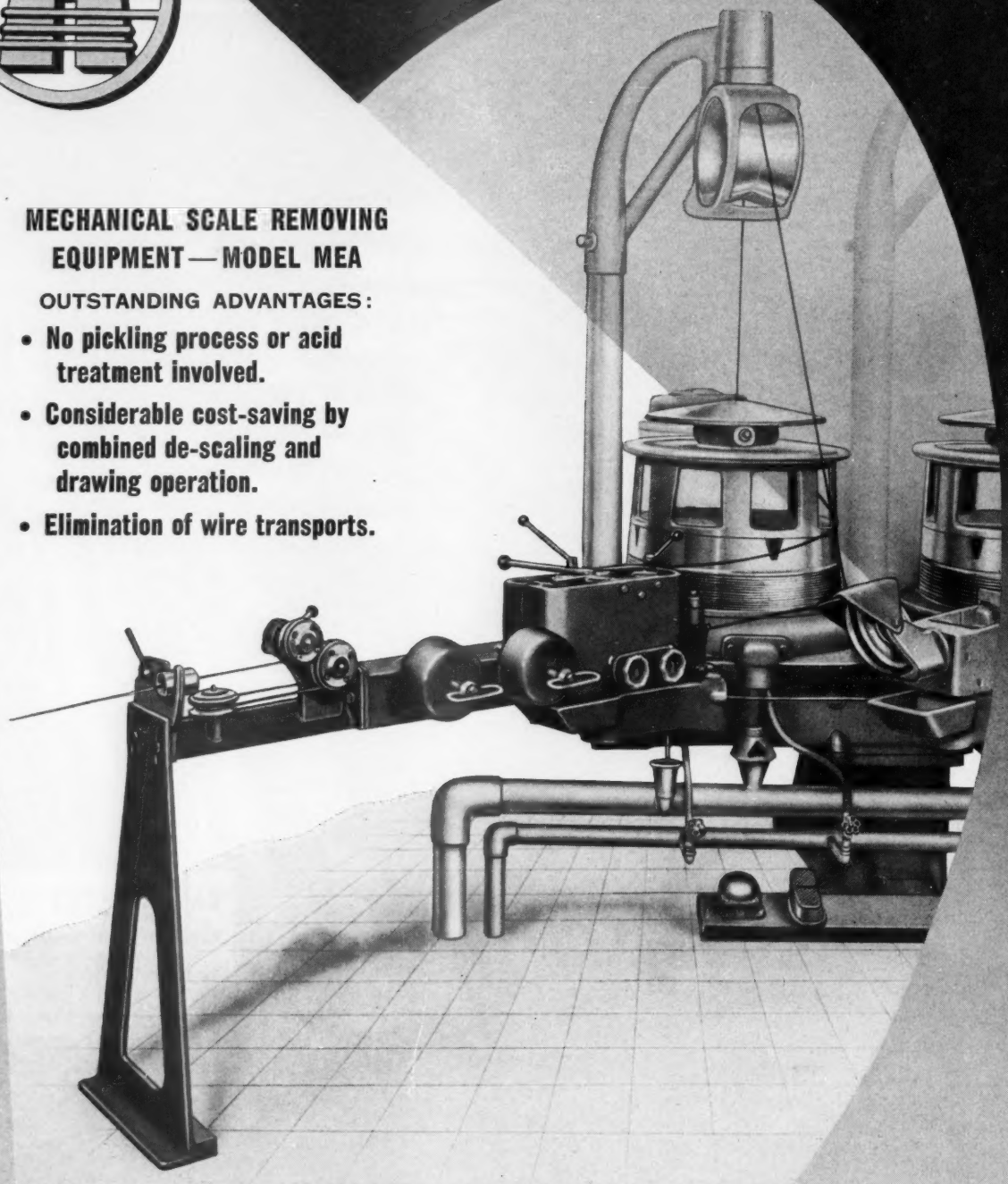
HERBORN



MECHANICAL SCALE REMOVING EQUIPMENT — MODEL MEA

OUTSTANDING ADVANTAGES:

- **No pickling process or acid treatment involved.**
- **Considerable cost-saving by combined de-scaling and drawing operation.**
- **Elimination of wire transports.**

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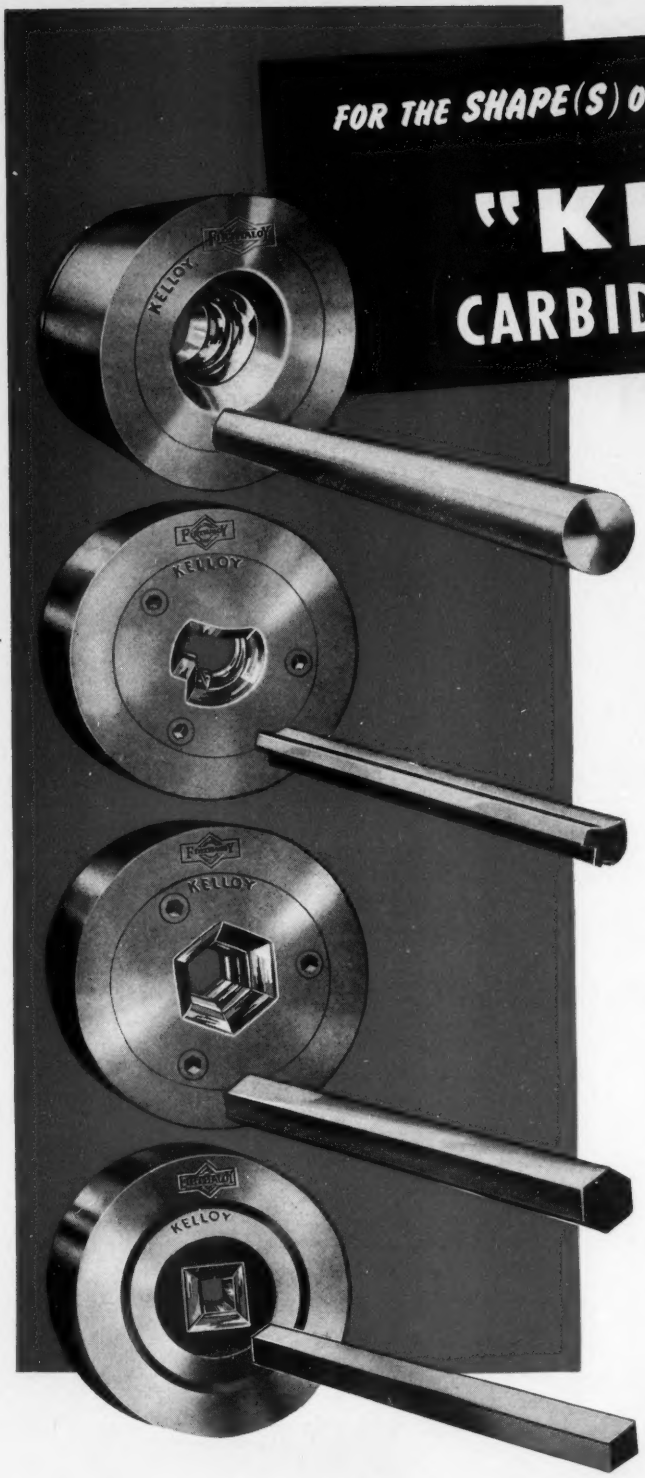
FOR THE SHAPE(S) OF THINGS TO COME . . SEE . . .

"KELLOY" CARBIDE SHAPE DIES

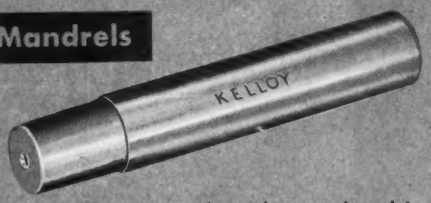


A die shaped to wire manufacturers specifications, enabling him to satisfy the most exacting customer, demands a combination of experience and engineering not readily available in the average tool room.

That combination of experience and engineering is as much a part of Kelloy as the famous Firthaloy rough cores used in actual production.

The satisfaction of Kelloy performance can be yours too. Our engineering staff is available to assist you with your drawing problems. Simply write or telephone for price list or information.

Mandrels



The same exacting workmanship employed in Kelloy shape dies, assures the superior carbide mandrel for your every tubing requirement.

Authorized distributors and finishers of FIRTH STERLING die materials

KELLOY CORPORATION

30 WEST 35th. STREET • NEW YORK 1, N. Y.

Just one *Supermatic* straightens and cuts full production of TWO bull blocks

High Speed wire processing —1/16" to 1" section

Here's high speed, automatic operation and high accuracy combined to give you the fastest and most continuous wire straightening and cutting for either hot rolled or cold finished stock.

The Continental-Medart *Supermatic* accepts each new coil without tedious threading . . . is entirely self-feeding thereafter . . . straightens (and removes scale from hot rolled) . . . and electronically measures and shears wire without a pause. Even the stub end of each coil is handled easier for ejection.

Production is greater than that of ordinary wire straighteners with far less attention from an operator. For straightening, sizing and polishing equipment of any size range, consult Continental-Medart.

Write for Bulletin 52 AA for detailed description or send us your problem.

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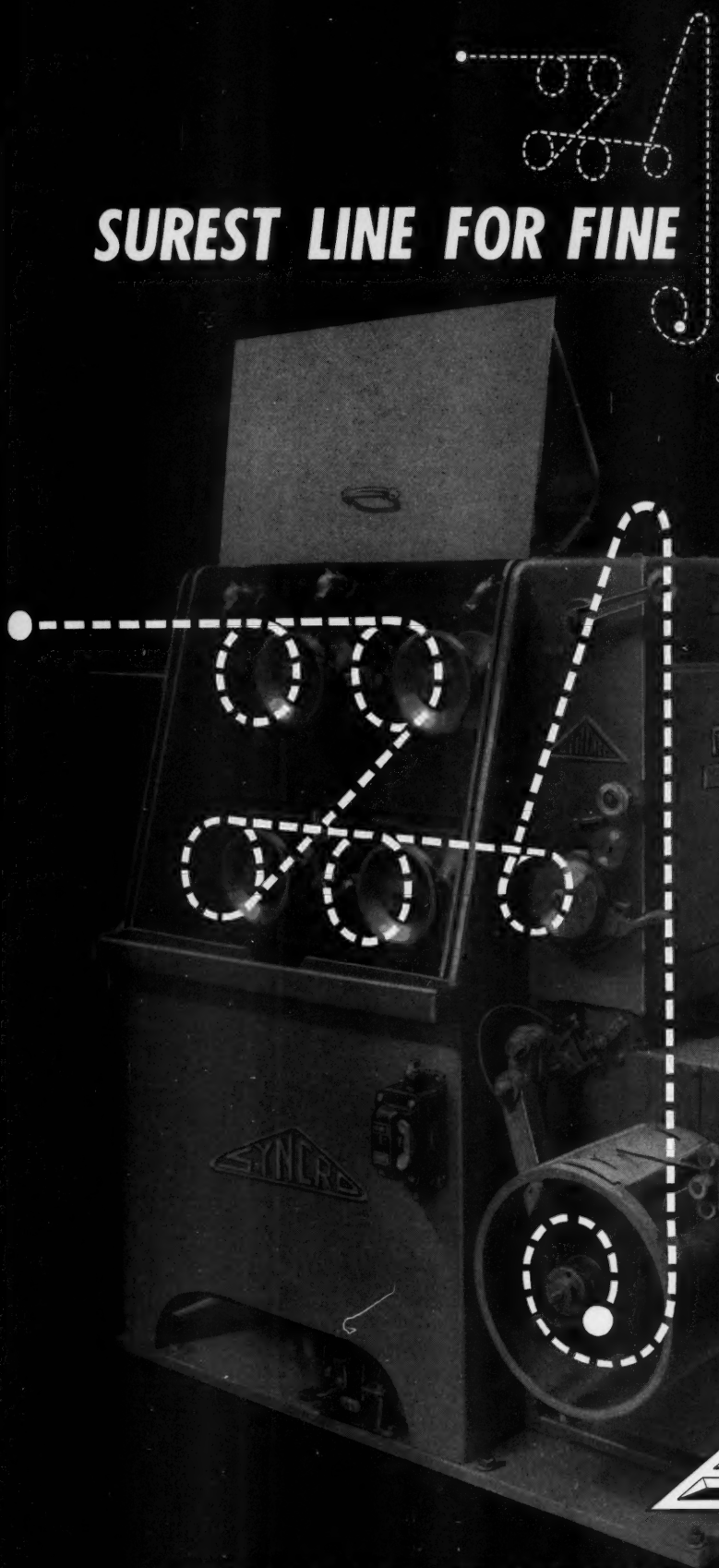
SUREST LINE FOR FINE WIRE PROFITS!



In fine wire drawing, whether ferrous or non-ferrous, Syncro fine wire machines are accepted the world-over for their advanced design and precision manufacture.

When you specify "SYNCRO" you get higher profits through greater *continuous* production of cleaner unmarked fine wire. Consult Syncro's experience, design and engineering facilities for any wire drawing problem.

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Better Machinery for the Wire Industry

SYNCRO MACHINE COMPANY

Perth Amboy, New Jersey, U.S.A. affiliated company: WINGET-SYNCRO Ltd., Rochester, Kent, England

How long did it take...

to get from here.... to here?

ANSWER: 21 YEARS

In 1911, the electric starter mercifully ended the backbreaking chore of hand cranking and became the first step on the way to modern starting at the flick of a finger.

As cars improved, the rubber industry grew along with them until today it is one of the largest in the country.

Monsanto has played an important role in this progress. Its complete line of accelerators, antioxidants and special materials for rubber are virtually standards of the industry. For example, Flectol* H imparts excellent heat resistance and Santoflex* AW is the standard antiozonant of the rubber industry.

For full information, send for your copy of the new catalog "Chemicals for the Rubber Industry." Write: MONSANTO CHEMICAL COMPANY, Rubber Service Dept., 920 Brown Street, Akron 11, Ohio.

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SERVING INDUSTRY... WHICH SERVES MANKIND

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Santoflex DD
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Santowhite L
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MERCAPTO ACCELERATORS
Santocure* NS
Santocure
El-Sixty*
Mertax (Purified Thiotax)
Thiotax (2-Mercaptobenzothiazole)
Thiofide* [2,2'-dithiobis (benzothiazole)]
Thiofide S (Seed Form)

ALDEHYDE AMINE ACCELERATORS
A-32
A-100

SPECIAL MATERIALS
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Santovar*-A
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Thiurad* (Tetramethyl-thiuram-disulfide)
Mono Thiurad (Tetramethyl-thiuram-monosulfide)
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GUANIDINE ACCELERATORS
Diphenylguanidine (D.P.G.)
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COLORS

REODORANTS

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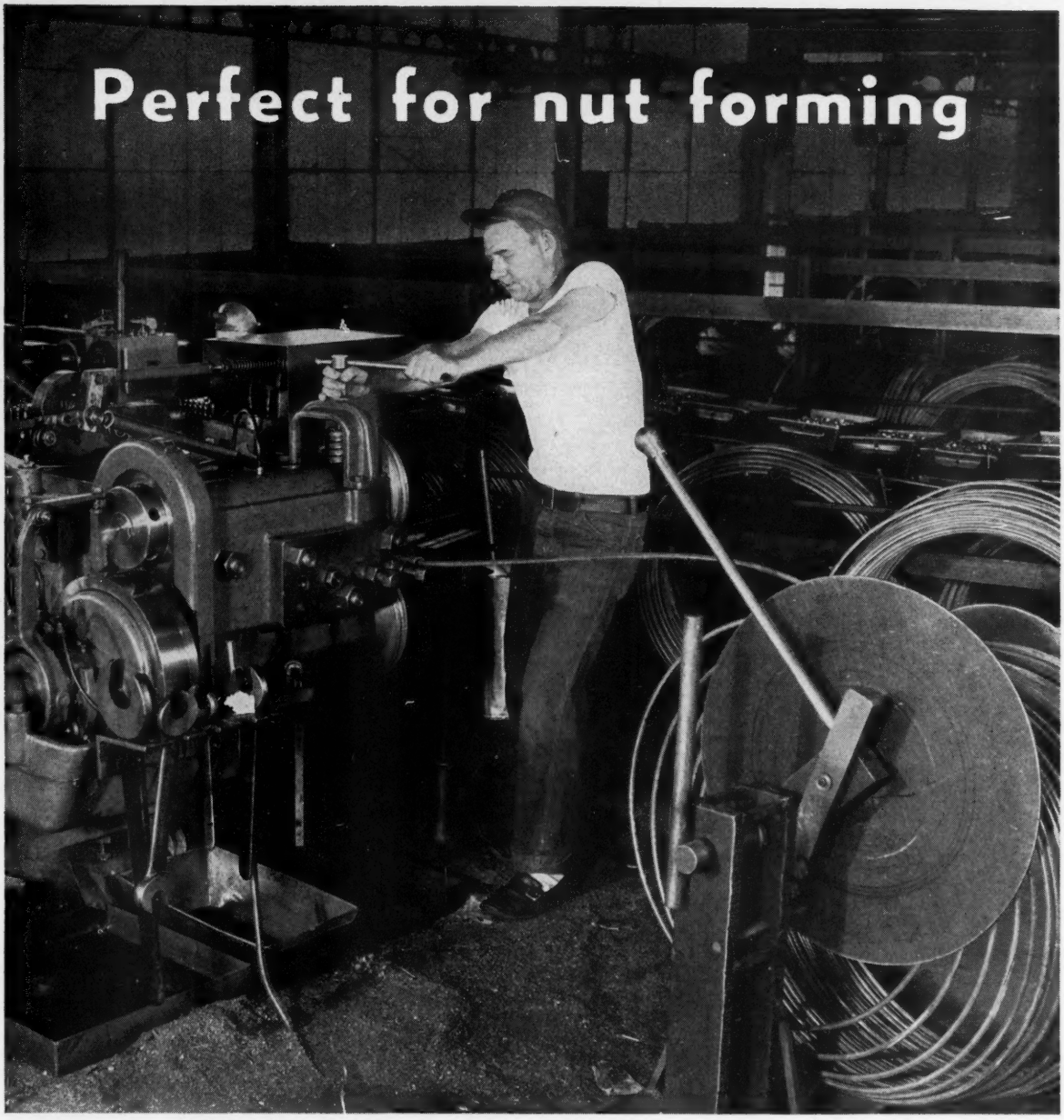

Photo courtesy of Decker Manufacturing Company

Youngstown

QUALITY YOUNGSTOWN SERVICE

SCRAPLESS NUT QUALITY WIRE

●Youngstown Scrapless Nut Quality Wire is outstanding for its excellent surface and sound internal structure. This uniform high quality results directly from close control of manufacture—from the ore mines clear through to finished product. Thus customers can always be sure that Youngstown wire will stand up under the punishing operations of cold heading, cold punching and thread tapping.

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices: Youngstown, Ohio - District Sales Offices in Principal Cities

SHEETS - STRIP - PLATES - STANDARD PIPE - LINE PIPE - OIL COUNTRY TUBULAR GOODS - CONDUIT AND EMT - MECHANICAL TUBING - COLD FINISHED BARS - HOT ROLLED BARS - BAR SHAPES - WIRE - HOT ROLLED RODS - COKE TIN PLATE - ELECTROLYTIC TIN PLATE - RAILROAD TRACK SPIKES

You can sell the difference

SCOVILL EXTRUDED COLD-HEADING WIRE (Cartridge Brass, 70%)

. . . because of its higher copper content and production by the Hot Extrusion process from uniformly sound Continuous-Cast billets . . . virtually eliminates defects (when attributed to wire) such as split heads or shanks . . . "out of round" heads . . . inadequate filling out of heads and shoulders . . . and rough "orange peel" effect. These are differences in quality you can SELL in your cold-headed products.

Let us help you specify the proper closely controlled Scovill temper to produce more nearly perfect headed parts . . . whether you require "flow" characteristics for heading, or "flow" plus essential rigidity for secondary machining.

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(COLD ROLLED)

in Coils or Straight Lengths

COMPLETE METALLURGICAL SERVICE

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ROUND EDGE FLAT WIRE	KEYSTONE SHAPED WIRE
SQUARE EDGE FLAT WIRE	SPECIAL SHAPED WIRE

Shaped Wire in Coils or Straight Lengths, Ferrous or Non-Ferrous.

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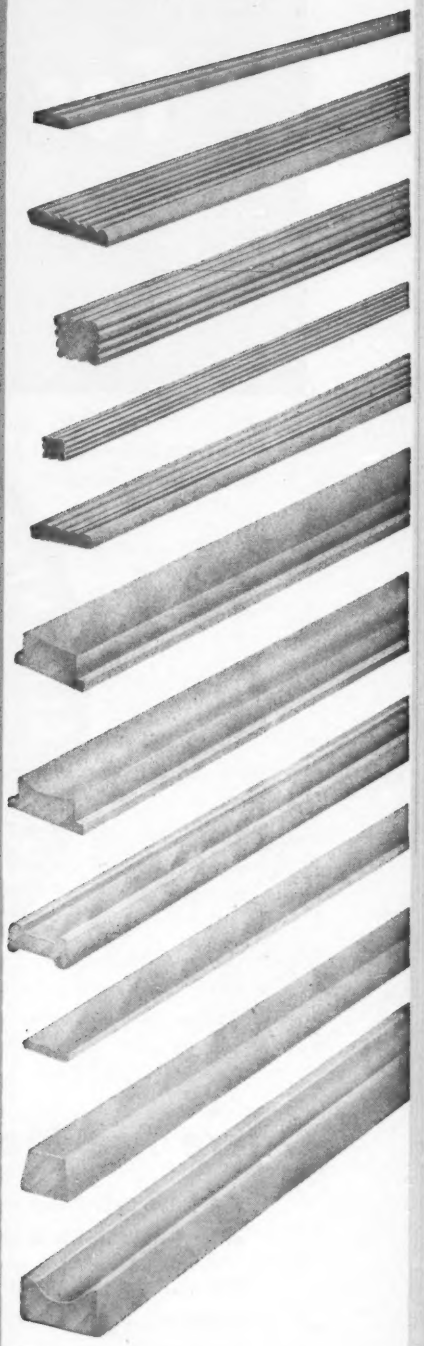

Manufactured by

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The Wire Outlook

As long as consumer spending continues high, business will be prosperous although, because of fierce competition, it will be a false prosperity for some. Reports are accumulating, however, that indicate a broad and solid base of rising business activity.

Factory orders are holding up and order backlogs are increasing. These are presently estimated to exceed 48 billion dollars. People's incomes are increasing and employment is rising. The forecast for construction is a 39.5 billion dollar year, as against 37 billions last year and 35.3 billions in 1953.

Steel, while running higher in recent months, is expected to average around 85% of capacity for the year. Steel production, the bellwether of business activity, is most important to any determination of future prospects. Tied in with steel is the status of the automotive industry, at present giving a good account of itself. The Federal Reserve Board has indicated its conviction that business will maintain its present pace without need of a liberalization of credit.

Appliance sales may rise 10% over last year, except for TV sets and air conditioning units, which probably will remain on an even keel.

Machinery sales should gain a little in 1955, with total sales slightly in excess of a billion dollars. Should they gain materially, it would change the picture for the year materially—for the better.

Farm equipment sales, sub-normal for the last two years, are expected to show a marked pick-up in volume, even if they do not attain to the record sales levels of 1951—2.2 billions.

Things frankly do not look good in the Far East. While our government is hoping that there will be no outbreak of hostilities, it is increasingly evident that Red China is bent on starting something. Even in this event, it is felt in Washington that a major war may be averted.

Copper, nickel and aluminum are on the list of short-supply materials. The loss of two months of copper production in Rhodesia is still being felt; in spite of the tremendous expansion of aluminum production, fabricators are complaining of inability to procure all they want, because of growing consumption for civilian purposes; nickel, due to its military uses, is chronically in short supply.

Wire has taken a strong up-swing, strengthened by the rural demand for merchant products. Manufacturers' wire is selling well. Spring wire orders are increasing and total sales for precision springs may exceed $145 millions this year. Welding wire and rod has shown further improvement in volume of orders and, of course, with high levels of construction and road building projects, welded wire fabric is moving in excellent volume. Wire rope volume is fair.

There seems to be little chance that taxes will be reduced this year. While in general it is desirable to curtail government spending and make more of what gainfully employed individuals earn available to them for the purchase of goods and services, as long as we face the prospect of a war, our national budget will continue to include a 40 billion dollar outlay for the armed forces.

We do, however, go on record as deploring the terrific waste of public funds through many services in which the government might better not engage. There is still a semi-socialistic set-up in national affairs that, because of politics in high places, has defied the Administration's efforts to reduce or eliminate entirely.

During the post-war years it frequently was said that stocks were under-priced. The boom in stocks in the last year has occasioned another "investigation." Probably the greatest single factor in the market rise has been public confidence in the future—particularly among the well-informed. So long as it remains this way, and is not the result of manipulation, the registering of its confidence in free-enterprise can be wholesome and stabilizing to business.

—from the Editor's Desk

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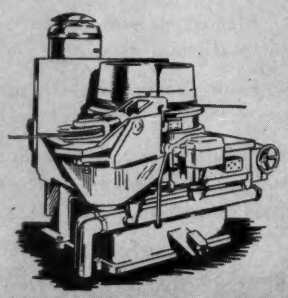

Shop foremen who have tried Steelskin lubricants *know* they can depend on Steelskin's consistent quality year after year... know they can rely on Steelskin's uniform composition, and texture. They know that Steelskin gives greater die-life, more uniformity, better quality in the wire products they produce. What's more, they know Steelskin's engineers are always ready to assist them with wire-drawing problems.

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WIRE
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A monthly publication devoted to the production of Wire, Rod and Strip.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 30 APRIL, 1955 No. 4

New Aluminizing Process for Steel Wire

by Bernard S. Westerman, Metallurgist
Page Steel and Wire Division
American Chain and Cable Company
Monessen, Pennsylvania

While the aluminizing of sheet and other forms of steel has been practiced successfully for a number of years, it was not until the Lundin process was developed and equipment made for it by the American Chain and Cable Company, that the aluminum coating of wire became a commercially successful possibility. This was due to the formation of a hard, brittle alloy under the soft outer coating that would not stand cold working and severe forming. The Lundin process overcame this practical fault.

The resistance to atmospheric corrosion and heat oxidation afforded by aluminum has been known for many years and has served as the incentive for the development of commercial processes for the application of protective aluminum coatings on iron and steel. A practicable commercial process for the coating of sheet and strip has been developed within the past several years. Also, batch processes have been developed for coating irregularly shaped articles such as castings, forgings, stampings, etc., of ferrous metals and alloys. More recently, attention has been centered on the development of practical processes for the continuous hot-dip application of aluminum to iron and steel wire.

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Some hot-dip aluminum coating processes utilize either controlled gaseous atmospheres to protect the cleaned metal surface from oxidation until the article is immersed in the molten aluminum bath; others utilize the strong fluxing action of molten salts either as separate baths or as layers of molten flux underneath or over the molten aluminum.

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The Page Steel and Wire Division, American Chain & Cable Company, Inc., has developed, and has patents on, a continuous hot-dip aluminum coating process for iron and steel wire based on the fluxing action of complex salt compounds applied to the wire surface from a hot aqueous solution.

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This aluminizing process, which is practicable from a production standpoint as well as economical in cost, consists of the following:

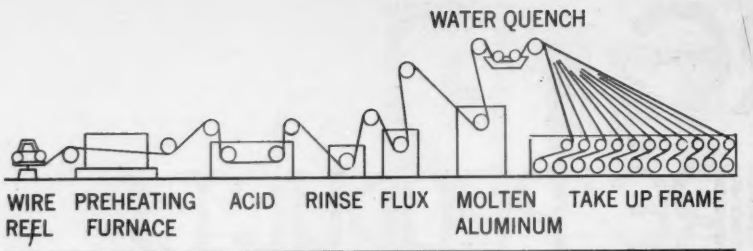
1. **Preheating.**
2. **Cleaning and pickling in hot acid solutions.**
3. **Rinsing in hot water.**
4. **Application of flux by immersion of wire in a hot aqueous salt solution.**
5. **Immersion in molten aluminum bath, the wire being withdrawn vertically to assure the uniformity of the applied aluminum coating.**

Pretreatment

Wire surface cleanliness is of paramount importance in the application of continuous hot-dipped aluminum coatings. Residual films of drawing lubricant on the surface of hard drawn wire are insoluble or only slightly soluble in commercial degreasing solutions and vapors as well as cleaning and acid pickling solutions. Heat imparted to the wire during this pretreatment accelerates subsequent cleaning and pickling in acid solutions. Pretreating temperatures are based on the wire size, speed of travel, length of furnace, etc. It is necessary also to adjust the furnace so as to avoid adverse effects on the physical properties of the wire so treated.

Cleaning and Pickling in Acid Solutions

Immersion of the preheated wire in acid cleaning and pickling solutions permits the rapid removal of all oxidized surface contaminants including the remnants of lime if utilized for drawing. Surface soil, if permitted to remain on the wire, imposes a barrier to the intimate contact of the molten aluminum with the wire surface, thus preventing the application of continuous coating. Best results have been obtained with hot hy-



SCHEMATIC LAYOUT OF ALUMINUM COATING UNIT

dro-chloric acid solutions, the temperature and concentration of which must be suited to the wire size, speed of travel, length of acid pickling tanks, nature of the wire surface, and so forth.

Hot Water Rinsing

Following acid cleaning and pickling, the wire is rinsed very thoroughly in hot water to assure the removal of iron salts and such adhering dirt as may be carried on the surface of the wire.

Fluxing

The flux utilized in the ACCO aluminizing process is a hot aqueous solution of zirconium or titanium fluorides or complex zirconium or titanium fluoride compounds with an alkali metal such as sodium or potassium. The temperature and concentration of the flux solution may be varied to suit the diameter and speed of the wire. It is desirable to maintain the temperature of the flux bath high enough to dry the flux on the wire as it passes through the air after leaving the flux bath. It is necessary that the flux coating on the wire be quite dry before the wire enters the bath of molten aluminum to avoid serious agitation of the aluminum at the point of entry with accompanying accelerated formation of aluminum oxide skimmings. Provision is made for the application of flux in a uniform film on the wire.

Hot-Dip Application of Coating

The fluxed wire enters the molten aluminum bath, passes under a suitable sinker, and leaves the bath vertically to assure uniformity of coating. The time during which the wire remains immersed in the molten aluminum, which is regulated by the immersion length and speed of travel, affects the thickness of the aluminum-iron alloy layer formed. The wire size and speed of travel affects significantly the total thickness or weight of the applied coating.

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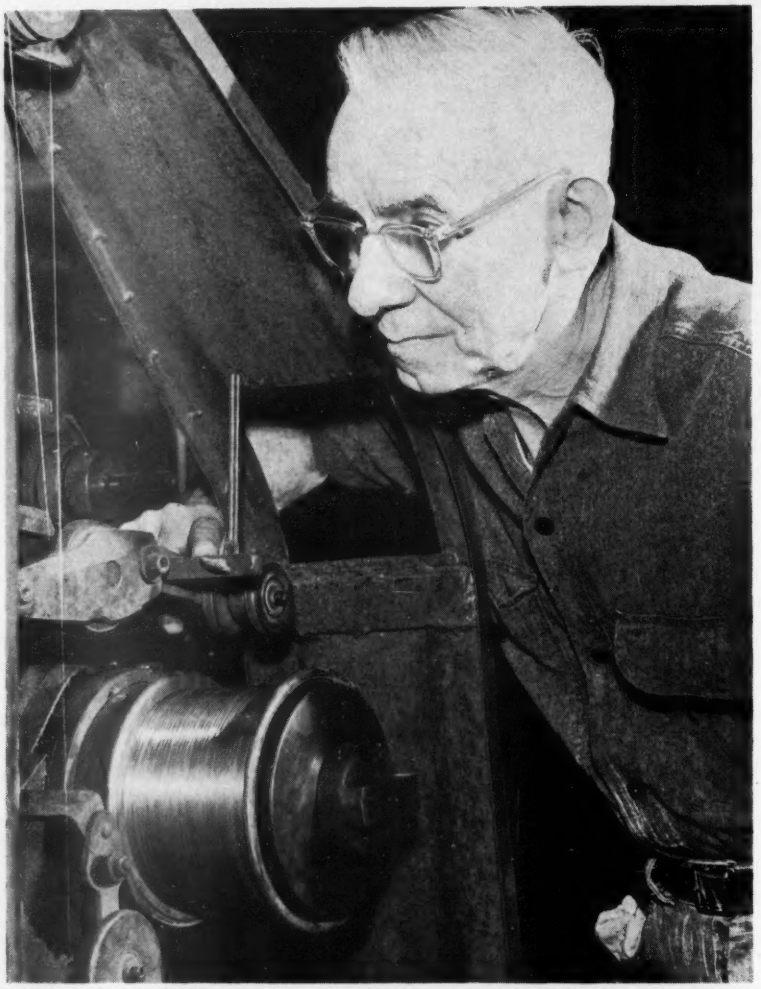
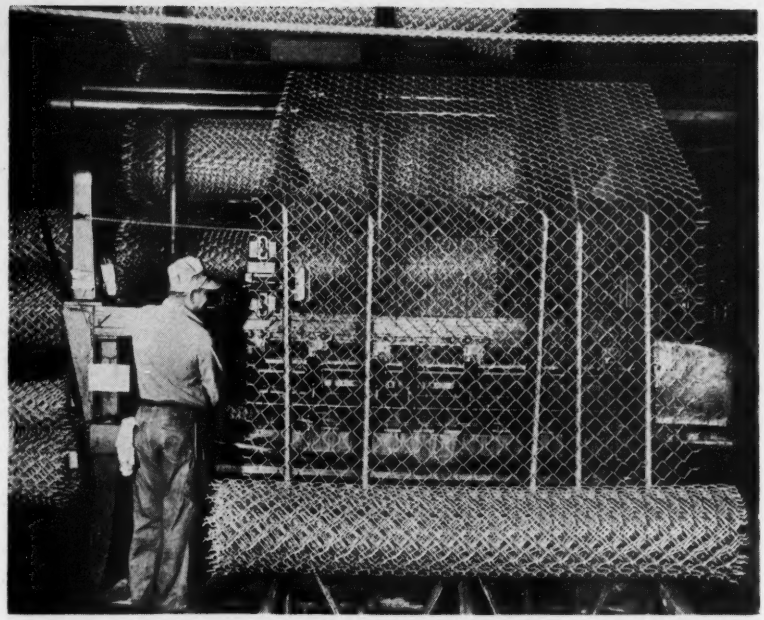
The molten metal is contained in a low frequency electric induction furnace. Relatively high purity alumina brick is the refractory used for the furnace lining. Advantages accruing from this type of furnace include the long refractory life as compared to the relatively short service life of externally heated or fired metal pans, uniformity of temperature throughout the bath by reason of the circulation of the molten metal through the inductor channels, the absence of dross sediment on the bottom of the furnace, close temperature control, etc. The necessity for the daily cleaning of the inductor channels to remove aluminum oxide as well as the periodic shutdown and partial draining of



A wire drawer at the Monessen, Pa. plant of American Chain & Cable Company regulates the drawing of aluminum-coated steel wire onto spools. * * * * * * *



Weaving of new aluminized chain link fabric at American Chain & Cable Company plant, Monessen, Pa. Added corrosion resistance, provided by aluminum coating, is expected to make the product popular for all types of fence installations.

the molten metal below the throat to permit the removal of aluminum oxide from the horizontal channel connecting the inductor channels provide the major adverse characteristics of this type of furnace.

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Commercially pure aluminum or aluminum to which alloys have been added may be used. A molten bath of commercially pure aluminum may be maintained at a temperature of 1250 to 1400°F for the application of satisfactory coatings; the addition of some alloys permits a reduction in the operating temperature consistent with the amount added.

Coating Ductility and Adherence

These characteristics provide the most troublesome problems in the production of most commercially acceptable hot-dipped metal coatings on iron and steel wire. Ductility is appraised by the ability of the coating to withstand elongation without cracking; adherence is the ability of the coating to withstand bending, wrapping, and other forming operations without peeling or flaking.

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Important factors controlling the ductility and adherence of aluminum coatings on iron and steel wire are as follows:

1. **Thickness and hardness of the alloy layer as a result of the chemistry of the molten bath and wire as well as the immersion time in the molten bath.**
2. **Chemistry of the molten bath as related to the applied coating.**
3. **Coating weight and thickness, smoothness or regularity, all being a function of speed of wire travel in continuous coating operations.**
4. **Wire size.**
5. **Grain size and structure of the coating at room temperature.**

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Hot-dipped aluminum coatings applied to iron and steel wire are duplex in nature consisting of an alloy layer resulting from a diffusion process and an outermost layer having a chemical composition similar to that of the bath; the latter layer is characterized by a cast structure. The alloy layer is hard and brittle; these conditions in combination with alloy layer thickness exert a controlling influence on coating ductility and adherence. To improve these properties, the thickness and hardness of the alloy layer, which is responsible for brittleness, must be reduced. Alloy layer thickness can be reduced to some degree by decreasing the immersion time of the wire in the bath and by reducing the bath temperature; alloy layer hardness may only be reduced by the addition of alloying elements to the bath. Investigators have shown that silicon and beryllium are the most effective additives in reducing the hardness and inhibiting the formation of alloy layer. The toxicity of beryl-

(Please turn to page 483)

Manufacture of aluminized barbed wire got under way recently at the Page Steel & Wire Division of American Chain & Cable Company, Monessen, Pa. The product is said to last two to six times as long as galvanized wire of equal coating thickness.

ACROMETAL
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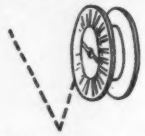
light weight, **heavy duty**
SHIPPING REELS!

Aluminum! ½ the weight of steel! Saves on freight costs.



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These are the BIG boys — made to handle heavy production. They're tough and rugged to resist distortion and assure long life. Unlike most cast aluminum spools which break readily when dropped (causing loss of spool and wire), these new ACROMETAL Reels are made of special aluminum-alloy which stand up under rough treatment and will not break. Light weight helps you save on freight costs. Look at them closely for workmanship—they're machined to close tolerances for accurate winding. That means less wire spoilage.

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Traverse and arbor hole to your specification

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616 Fifth Street N., Minneapolis 1, Minn.

The Turks Head in Shaped Wire Production

by Lawrence J. Sarkozy
Chief Field Engineer
The Fenn Manufacturing Company
Newington, Connecticut

Part I

Part I treats of the origin of the Turks Head, its applications and principles of operation. It also traces the development of the machine, pointing out early faults encountered both in the Turks Heads and their use.

The author graduated in 1932 from the Worcester Polytechnic Institute and is a professional engineer, State of Connecticut. He joined Fenn in 1948, having been Chief Engineer of the Henry and Wright Division of Emhart Manufacturing Company of Hartford and Research and Development Engineer of The Hartford Empire Division of Emhart. He served as design engineer and sales engineer at Fenn, before assuming his present duties.

In April, 1954, a comprehensive technical article* appeared in this publication, covering the unusual economies that are derived from the use of shaped wire in manufacture of metal products and equipment. In this article mention was made of Turks Head equipment. In February, 1936, **Wire and Wire Products** published an article entitled "Drawing Square, Rectangular and Irregular Shapes and Sections", which described the operations of the Turks Head at that stage of its development, mentioning some of the advantages inherent in this device. The purpose of this article is to carry the discussion a step farther by pointing out how economies in the production of these shapes can be effected through the use of Turks Heads.

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It would be interesting to know why the name Turks Head was applied to a metal-working machine. It is probable that a seafaring man with some imagination fancied that he saw a resemblance between the four rolls of the machine and the strands of the decorative Turks Head knot, which was much favored by sailors. At any rate, the machine was first called by this name and the name has stuck, possibly with an adverse effect upon its later acceptance by industry.

Origin of Turks Head

According to all available evidence, the basic Turks Head unit was first offered to the Wire Industry by the **Mossberg and Granville Company,** later **Standard Machinery Company,** who in the late 1890's operated a machinery building service catering to the jewelry and precious metal industry, which was then making such great strides in the Providence-Attleboro area, now the heart of the costume jewelry industry in the United States. Among the problems then facing that industry was the forming of so-called fancy shapes in small production quantities in precious metals. The carbon draw dies and hardened steel dies then available did not answer this need; they therefore welcomed the Turks Head, because it offered lower tooling cost, reduced operating costs, great flexibility, and a better finished product.

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Due to these advantages, use of the Turks Head spread rapidly in the jewelry industry, and the ingenuity displayed by its users soon became known to the ferrous and non-ferrous industries. Many attempts were made to adapt it to these production-minded industries, but with little success because of the higher tensile strength of the materials used and the greater drawing speeds required to meet their high production requirements.

Adaptation to Other Industries

When in 1948 **The Fenn Manufacturing Company** purchased manufacturing rights from Standard Machinery Company of Auburn, R. I., a survey was conducted to determine the lines along which development of the device should proceed. It was learned that the problems of Turks Head users fell into three definite categories. Drawing speeds were too low, tolerance variation was excessive and the maximum section which could be produced was extremely limited. Fenn was faced with these tasks: to redesign the device in order to eliminate the above shortcomings, and to overcome the negative feeling which they had caused. Detailed study indicated three underlying causes for the users' complaints.

Early Design Shortcomings

First, bearing capacities were inadequate to handle large reductions of ferrous metals. By designing roller bearings which use the roll shaft as the inner race and by increasing length and diameter of the roller bearing rolls, considerably higher bearing capacities were made possible within the same limited space.

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Second, field experience showed that many customers had not selected the proper size Turks Head for the application and that the relation between reduction and drawing speed was generally misunderstood. Furthermore, little information was available to the customer regarding the influence of drawing lubrication. We have been faced with the problem of endeavoring through technical articles and other educational procedures

* "The economy of shaped wire," by Emmett H. Mann, April, 1954.

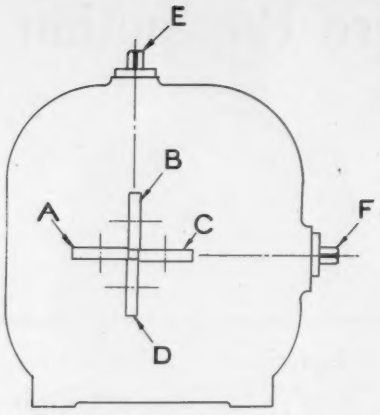

Fig. 1—Roll arrangement, Universal type. * *

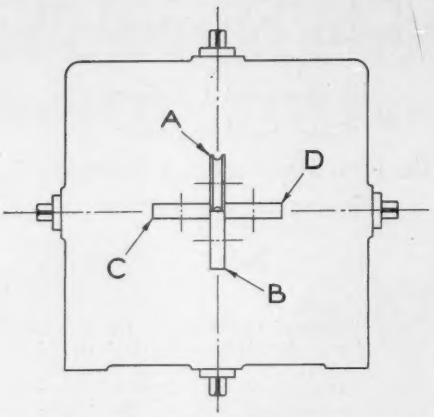

Fig. 2—Roll arrangement, Plain type. * *

to correct this situation by disseminating accurate up-to-date information on proper Turks Head application, capacities and rolling practice.

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Third, it was determined that sizes then available did not meet industrial needs, as a result of which larger sizes with greatly increased bearing capacities were developed. These larger units led to the necessity for improved mounting, which in turn led to development of the Wire Shaping Mill equipped with one or more Turks Heads, motor driven reel with positive self-stripping drum, and recirculating stock cooling and lubricating systems.

The Turks Head Principle

Probably because of its unique name, it has been difficult to make entirely clear to industry precisely what a Turks Head is and what it can do. Perhaps if we say that it is analagous to an adjustable draw die, but infinitely adjustable within its limiting dimensions, a better understanding may be conveyed. Yet the Turks Head operates on the rolling mill principle, except that the entering stock is drawn between not one, but two, pairs of rolls, one pair horizontal and one pair vertical. Hence, the same qualities are imparted to the metal as in a rolling mill, namely, improved surface finish, accurate size and shape, and improved quality of the metal due to improved grain structure of the section.

Types of Turks Heads

There are two types of Turks Heads, the Universal type and the Plain type. Figure 1 shows the arrangement of rolls in the Universal type used for drawing square, rectangular and some special shapes. Figure 2 shows the roll arrangement in the Plain type which, contrary to its name, is used for drawing special shapes, such as the rounded shape shown. Figures 3 and 4 show the Universal and Plain types respectively.

Adjustment

In the Universal type, Figure 1, roll A is fixed, except for minor adjustments. Adjusting screw E moves rolls B and C up or down together; this keeps the side of roll C in constant contact with roll B. Adjusting screw F moves rolls C and D together, right or left. Thus two easy-to-make settings provide for any size square within limiting dimensions of the rolls, as well as for any rectangle within the same limitation.

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In the Plain type, Figure 2, each roll is adjusted independently. Due to designed side play of the rolls in their roll boxes, adjustment of

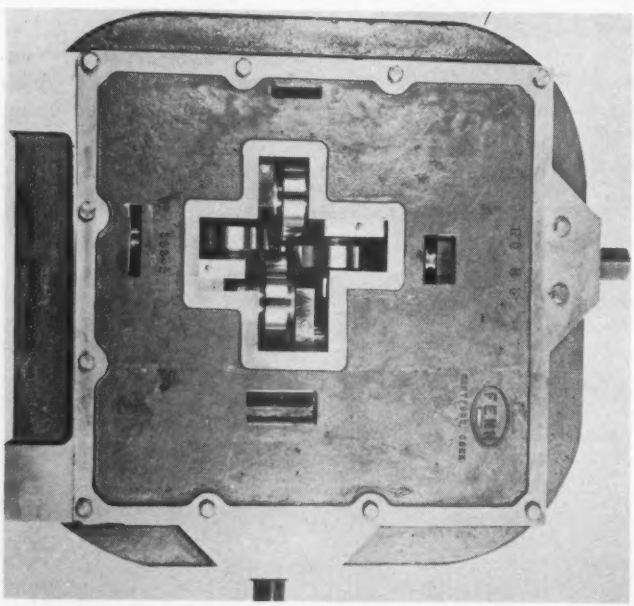


Fig. 3—Universal type Turks Head. * * * * * *

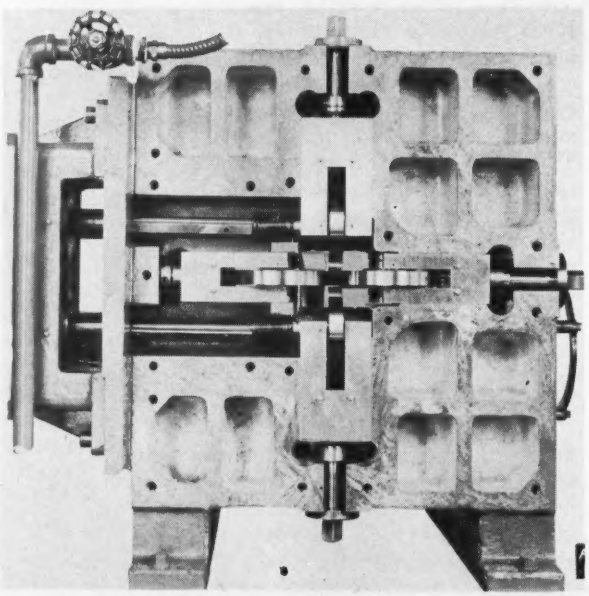
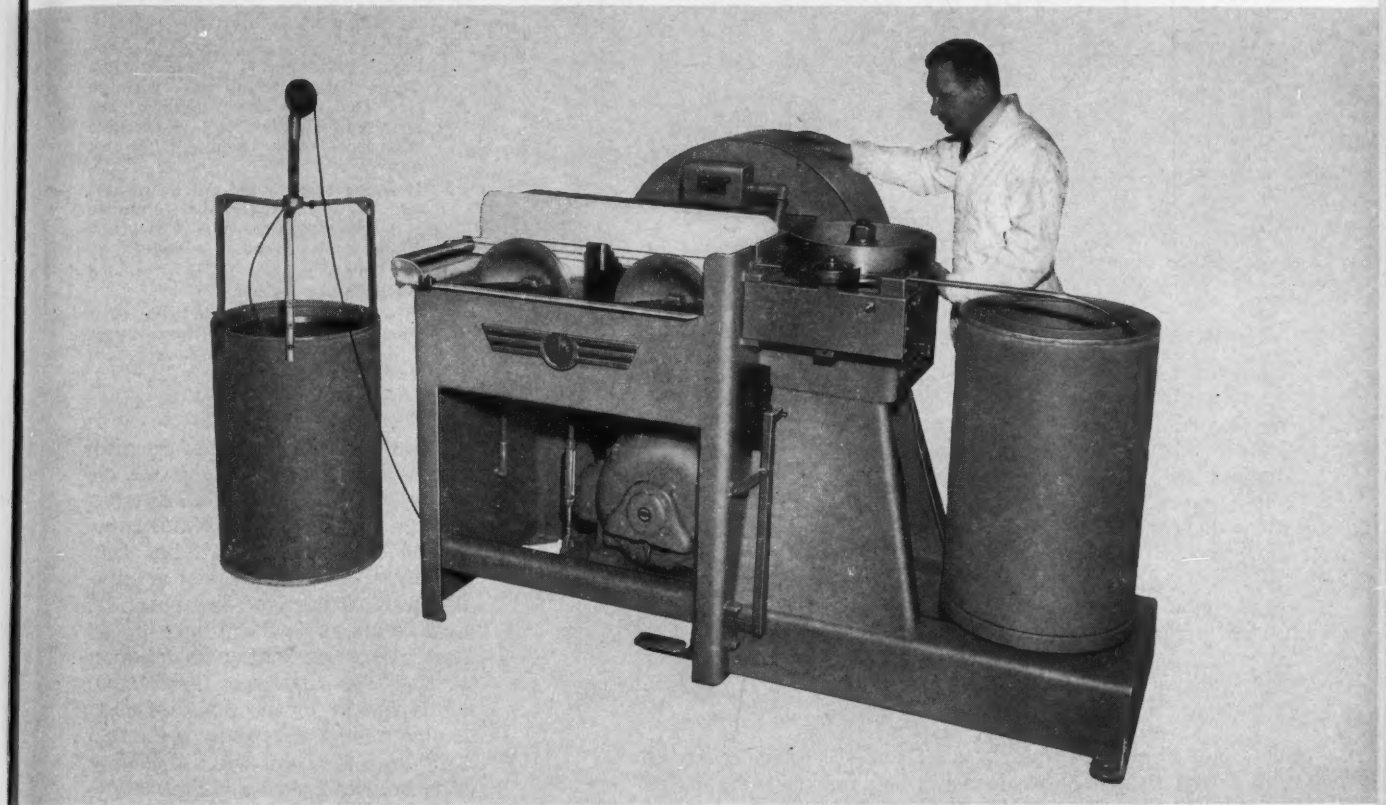


Fig. 4—Plain type Turks Head, cover removed. * * * *

Coulter & McKenzie **DRAW·PAK** *Equipment*



Model 116—Continuous Fine Wire Drawing and Packaging Machine

Continuous Drawing & Packaging Machine Yields HIGHER EFFICIENCY in fine wires!

Sustained higher efficiency is being realized in fine wire production using banks of five or six Coulter & McKenzie Model 116 machines. Each machine will continuously draw and package a 500 to 750 pound wire at a rate up to 1500 feet per minute.

Both small and large wire mills are now producing continuous coils from 500 to 750 pounds with a minimum capital expenditure and they are attaining assured production approximating *automation*. Multiple shutdowns and handlings are thereby eliminated, and production volume is greatly increased. The **Draw-Pak** 116 is designed for low carbon steel wire starting at No. 13 gauge (.0915″) hard drawn, but is being supplied to meet a wide variety of customer requirements.

Devices for stationary drum and rotating drum payouts are available at low cost from Coulter & McKenzie to accommodate all fine and intermediate wire sizes in various container sizes. Handling facilities are also available for overhead drum lifting. Economical hand lift trucks or attachments for your conventional power trucks are offered nationally.

The wire processor will want this package because it saves him money; the wire mill must have this process to obtain higher efficiency through longer continuous runs and direct, ready for shipment packaging.

Prompt attention to your inquiry may be assured by specifying the wire to be processed and its ultimate application.

Patents Pending

Continental Can Company Licensee

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THE COULTER & McKENZIE MACHINE CO., INC.

BRIDGEPORT 3, CONNECTICUT, U. S. A.

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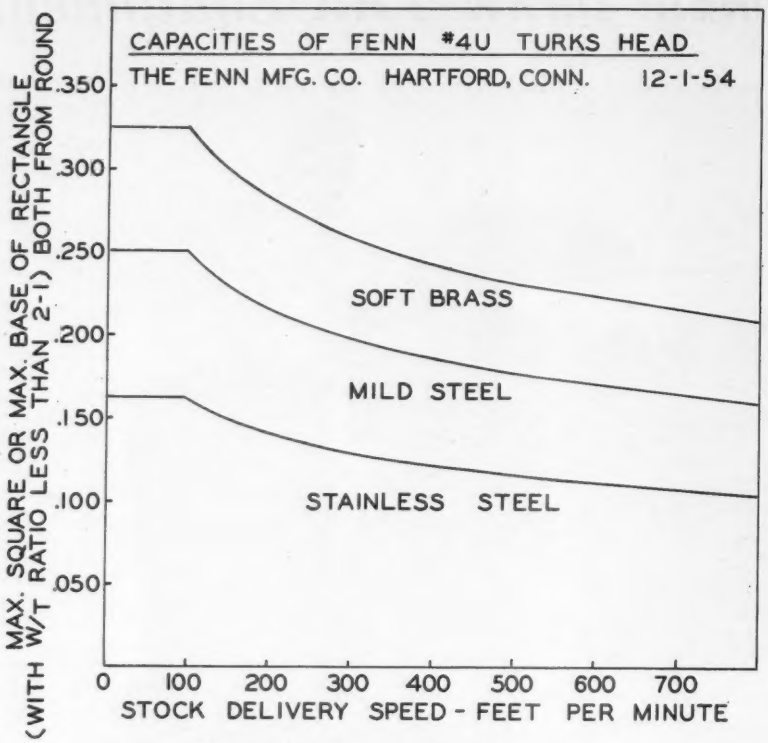

Fig. 5, Typical Capacity Curve. * * *

rolls C and D must be made so that rolls A and B are centered within their roll boxes; side thrust is then taken by side rolls C and D.

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In the Universal type it will be apparent that a change in setting results in a change in the centerline of the opening. Therefore, the Turks Head must be mounted on a bracket which is adjustable both horizontally and vertically when used on a machine whose puller center line is fixed, such as a draw bench. However, when used on our own machine with its specially designed shedding drum the error is automatically compensated for. Nevertheless, we too incorporate both horizontal and vertical adjustments of the mounting bracket to correct for misalignment in machining and mounting, curvature of the wire and other factors beyond control, because the final operating alignment is critical in preventing "cast" in the finished product.

The Turks Head in Industry

As the products of industry become ever more numerous and diversified, manufacturers require increasing quantities of shaped wire of many shapes and sizes. Yet at the same time production and inventory economies were never more imperative. The use of Turks Heads permits the manufacturer to buy and stock comparatively few sizes and shapes of wire, because he can draw many shapes, over a substantial range of sizes, on one size machine. He can save on tooling costs because a simple roll adjustment supplants special draw dies, and again because of the long life of the rolls. He can save on production costs because fewer passes are requred, for the same reduction, than in other types of machines, and with lower power requirements. Not only can he take advantage of these inventory, tooling and production savings, but he can produce shapes to very close and uniform tolerances, with improved surface finish and improved quality of the metal.

Capacities of Turks Heads

The graph, Figure 5 shows a typical capacity curve of the #4U (Universal type) Turks Head, with "maximum square from round", in inches, plotted against delivery speed in fpm. The capacities are to be interpreted as follows:

1. **To obtain commercially sharp corners, two passes through one Turks Head, or one pass through two Turks Heads in tandem, are required. The former is preferable where extreme accuracy is required.**
2. **If sharp corners are not necessary, and slightly greater size tolerance is permissible, one pass through a single Turks Head is adequate.**
3. **All entry rounds to be annealed stock before rolling.**
4. **Size shown may be the side of a square, or the width of a rectangle with W/T ratio of less than 2 to 1.**

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As concrete examples, the following actual case studies are cited. A leading automobile manufacturer is forming a rectangular section .135″ x .138″ at 100 fpm holding a tolerance of plus or minus .0002″, using a 10 hp motor. A steel company is forming a 3/16″ square from an entry low carbon wire of .243″ diameter at 625 fpm, using a 50 hp motor. Another steel company is forming a rectangle .187″ x .500″, starting with low carbon round-cornered rectangle .257″ x .562″, at 300 fpm, using a 30 hp motor. In another instance a rectangle 5/16″ x 7/16″ is being formed from an entry low carbon round of .500″ diameter, at 80 fpm.

Summary

In Part I we have traced the development of the Turks Head with much of the emphasis on early troubles and faults encountered. Some of these difficulties have been inherent in the early designs, but, as is the case in so much machine tool history, many difficulties have been the direct result of attempting to make the machine do more than it was intended to do, or is in fact capable of doing. In most cases, the result has been overloading, which has resulted in unacceptable tolerances in the finished work, or in actual damage to the machine. A subsequent article will deal with modern applications and the sections being formed, in order to provide a better understanding of the capabilities of this unique machine with the seagoing name.

Quality Control of Vinyl and Polyethylene Electrical Insulating and Jacketing Materials

by R. C. Boyd
Manufacturing Department
Bakelite Company
A Division of Union Carbide and Carbon Corp.
Bound Brook, New Jersey

A paper delivered on December 8, 1954, at Asbury Park, N. J., at the Third Annual Wire and Cable Symposium, sponsored by the Signal Corps Engineering Laboratories, Fort Monmouth, N. J.

Before talking specifically about quality control of vinyl and polyethylene electrical extrusion materials, we first must review the tenets upon which a logical quality control system is based. Very simply, any quality control system consists of routine surveillance of three items: raw materials, process, and finished product. It is essential that good testing methods be available which apply to each of these three items as required and which are meaningful in terms of finished product application. We shall detail the systems used with such methods for one vinyl and one polyethylene material.

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The vinyl insulating material which will be discussed in detail is an opaque, flexible, thermoplastic compound manufactured for extrusion both as a primary insulation at commercial power frequencies and as a jacketing stock.

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The raw materials contained in this product consist of vinyl chloride resin, an ester plasticizer, a combination of a calcium carbonate and clay filler, and a lead stabilization system.

Fig. 1
Raw Materials

Vinyl Chloride Resin
Ester Plasticizer
Calcium Carbonate
Clay
Lead Stabilizer

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The process by means of which these various raw materials are fabricated into a finished extrusion material is outlined in Figure 2.

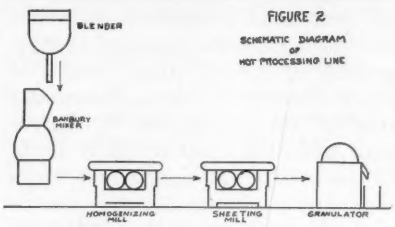

FIGURE 2
SCHEMATIC DIAGRAM OF HOT PROCESSING LINE

It can be seen that all of the various raw materials are charged in the correct proportion to a ribbon-type jacketed blender. After proper mixing of all of these raw materials in this blender this relatively crude mixture is then transferred to a Banbury mixer where it is exposed to high shear and high temperatures during its mixing cycle. After removal from the Banbury mixer, the material is further homogenized on a two-roll mill, thence it is transferred to a sheeting mill and fed to a granulator.

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With this background, we must for purposes of establishing a quality control system, detail those properties desired in the ultimate application of the material (Figure 3) as well as those additional properties desired by the extruder of the material.

Fig. 3
Properties

Finished Extrusion	Fabrication
Insulation Resistance	Extrudibility
Tensile Strength	Color
Modulus of Elasticity	Contamination
Ultimate Elongation	Bulk Factor
Hardness	Granulation
Low Temperature Flexibility	
Deformation Resistance	

It can be seen that the properties which are of paramount importance to the fabricator or extruder are fairly practical considerations and ones which have to do principally with the extrusion operation. Obviously, all parties involved are interested in maintaining the basic properties desired in the final application. This is pointed out here because many design engineers sometimes conjure up theoretical materials which, while being suitable in ultimate application, cannot be manufactured or extruded.

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Taking a closer look at this list of properties, it is apparent that it would be unwise to attempt to control all of these variables without an understanding of the relationship of each to the raw materials and the process involved. Hence, we must first decide which of these properties are the primary or controlling ones and which are secondary in terms of meaningful to the compounder of the plastic material. Further, we must assume that the proper formulation, when correctly compounded and extruded, yields an insulation or jacket which satisfies the requirements of the application. For purposes of simplification, we can group all of the properties and primary control points into three general categories.

Fig. 4

General Property	Primary Control Point
Electrical	Raw Materials
Mechanical	Primary Weigh
Extrusion	Process

The electrical property of this vinyl material which is of particu-

lar importance is insulation resistance. Experience has told us that raw material variability is largely responsible for electrical variability in this finished product. Accordingly, the primary emphasis in electrical testing should be placed on the raw materials. Other properties of the raw materials such as chemical composition, color, particle size, etc., are also of importance.

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Hence, raw material specifications must be established to cover this point and an incoming inspection scheme should be designed to maintain these specifications. Since most of the raw materials involved are derived from a batch manufacturing process, the sampling scheme follows this. No recourse to a statistical sampling plan is necessary.

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Raw material variation has little, if any, effect on mechanical properties providing these raw materials are controlled adequately by specifications. The major variable which adversely affects mechanical properties has to do with weighing errors. This is fairly obvious if one considers the large effects on tensile strength, etc., which are observed when an incorrect quantity of plasticizer is added at the primary weigh point. As a consequence, validity of weigh-up is believed to be the primary control on mechanical properties of the finished product. It can be easily controlled by means of sampling and testing the primary weigh prior to the time it passes through the remainder of the process. Specifically, tests which are applicable to this problem are specific gravity, tensile strength, and durometer hardness. Figure 5 shows an innovation as regards specific gravity testing which may well be of interest.

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Illustrated are a series of specific gravity gradient columns. Each one of these columns is constructed by carefully mixing a concentrated solution with a relatively dilute solution of the same inorganic salt. When this is done properly, a

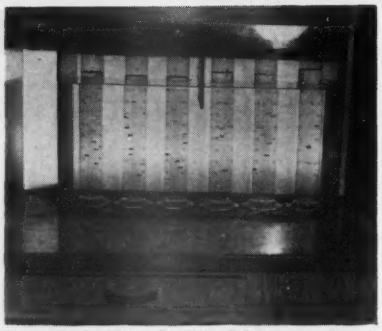

Figure 5—Specific Gravity Columns.

column having a uniformly variable density from top to bottom results. The specific gravity range represented by one of these columns is 1.20 to 1.25. The white disks suspended in the liquid are continuous calibrating disks and all that need to be done in order to obtain a measurement of specific gravity of a solid plastic material is to drop it in the column and read off its specific gravity dependent upon the level which it seeks in the column. Most of us are familiar with conventional tensile strength and durometer hardness testing and it is felt that no detail need be given at this time concerning these tests.

Assuming that the correct raw materials and proper weigh-up techniques have been used, the major control of extrusion characteristics on a given vinyl material is the manner in which these various raw materials are processed. It is well known that flexible vinyl formulations are mixtures in a relatively simple sense. The conventional hot processing line achieves a proper dispersion of these various raw materials. If the degree of dispersion is not sufficient, poor extrusion characteristics will result. Typical of this is roughness or surging which results in poor dimensional control and normally lower extrusion rates. An extrusion technique has been devised utilizing a conventional laboratory size extruder where marginal conditions of extrusion are employed such that the material is exposed to an approximation of the most stringent operating conditions which would be encountered in the field. In other words, by means of this laboratory extrusion test a certain degree of roughness is purposely created in the material during extrusion and thus variability due to process can be
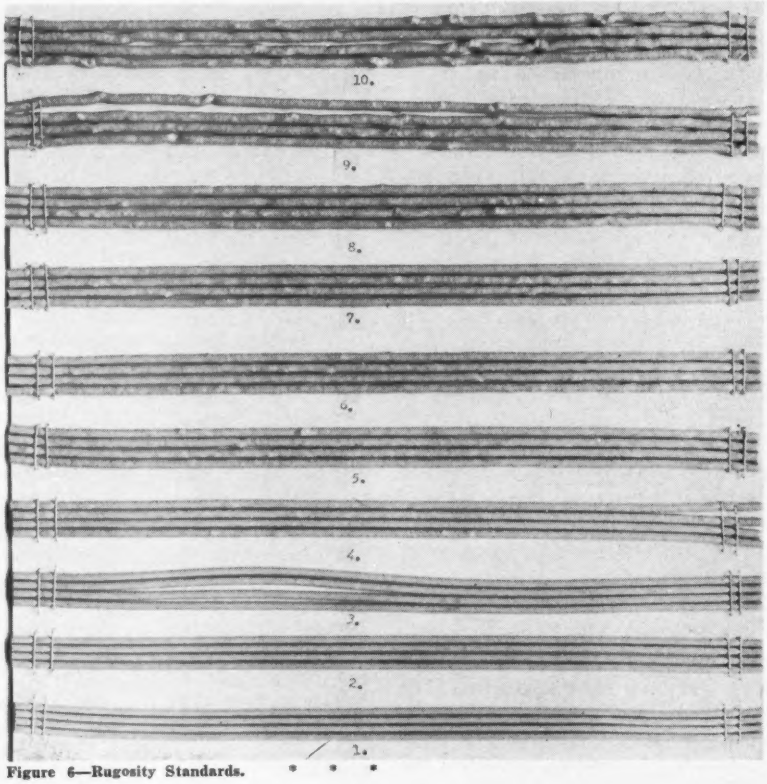
Figure 6—Rugosity Standards.

catalogued and controlled. Figure 6 illustrates the various degrees of roughness experienced when utilizing this test.

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Rarely will any commercial extruder experience the highest degree of roughness shown! Other properties of the material which are of great interest to the extruder or the fabricator have to do with particle size, bulk factor, color, and freedom from contamination. All of these factors are associated with the process and conventional controls are established to cover these points.

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Returning to Figure 3 to review, it can be seen that we have established specific controls on this material at various points in the overall process and no mention has yet been made of how much checking should be done on the finished product itself. No attempt will be made here to describe how it is decided that some of these properties are rechecked on the finished product if it has once been measured somewhere else. Briefly, it amounts to integrating one's complete knowledge of the precision of the tests involved, the process variability, and assaying the degree of risk one can assume. This job will vary from product to product as well as from manufacturer to manufacturer.

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In the case of polyethylene materials, compounding, and the establishment of a quality control system, are essentially the same as for vinyl material just discussed. The polyethylene material we will be concerned with is a compound manufactured principally for use as a primary dielectric on wires and cables where extreme low-loss characteristics over a wide temperature and frequency range are desired. One of the most common uses for this material is in solid dielectric coaxial cables. This material is designed to meet the requirements of U. S. Government Specification MIL-D-3054A, Type N. The raw materials contained in this product consist of polyethylene resin and an anti-oxidant. The process by means of which these raw materials are compounded to yield a finished product involves a Banbury mixer, an homogenizing mill, a sheeting mill, and a granulator. Thus, it is essentially the same as that process used for the manufacture of the flexible vinyl material previously discussed.

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Again, it is desirable that one establish those properties desired in the ultimate application of the material as well as those additional properties needed by the extruder of the material prior to the time any quality control system be established. Figure 7 details these particular properties.

Fig. 7

Finished Extrusion	Fabrication
Tensile Strength	Extrudibility
Ultimate Elongation	Contamination
Brittle Temperature	Bulk Factor
Melt Index	
Dissipation Factor	
Dielectric Constant	
Dielectric Strength	

Using the same approach as before, we can simplify this list of properties decidedly. Figure 8 illustrates this along with the primary control point relative to each general group of properties.

Fig. 8

General Property	Primary Control Point
Mechanical	Raw Materials
Electrical	Raw Materials
Extrusion	Raw Materials - Process

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The mechanical properties of a polyethylene compound of this nature are controlled almost completely by the mechanical properties of the base resin used. Accordingly, raw material specifications must be established which limit the variables with which one is concerned.

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The primary controller and most easily measured general property of polyethylene which approximates a measurement of average molecular weight is the property known as Melt Index. For those who are not familiar with this test, it is detailed as an ASTM Method under the designation D-1238-52T. This method describes an apparatus which consists of a high-precision piston-operated extrusion apparatus. It has been our experience that the Melt Index values obtained on a given material are correlative with most basic mechanical properties of a given resin. Accordingly, the primary control on mechanical properties of the compound rests with a Melt Index control on the specific resin-type used. Secondary controls are also maintained for tensile strength, ultimate elongation, and brittle temperature.

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In this particular material, dielectric properties are of extreme importance, and electrical controls involving the precise measurement of dissipation factor and dielectric constant should be maintained on both the base resin used and on the finished product. Another problem associated with the electrical properties of this material is the potential inclusion of contamination which might cause dielectric breakdown, so we must closely observe and control the presence of particles of extraneous material in our raw materials. This problem also extends into the process. It should be stated here that the inclusion of the anti-oxidant in this compound is for the principal purpose of maintaining the dielectric properties of the material during its thermal processing life. The question of whether the anti-oxidant contributes to protection against the effects of outdoor exposure is a matter which involves the degree expected and this contribution by the anti-oxidant is in general questionable.

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Extrusion properties of this polyethylene compound are associated primarily with base resin quality and the degree of dispersion achieved by all the raw materials during processing. In this case an extrusion control is maintained on the finished product utilizing essentially the same type of equipment as was described before.

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Certain of the tests mentioned

(*Please turn to page* 482)

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Statue of Liberty

Registration fee includes all technical meetings, cocktail party and banquet, plant tour, bus fare and luncheon. $15.00 for members; $17.00 for non-Members; Ladies Dinner Tickets $8.00.

The program on the next page has been revised as to time of presentation of Papers and replaces the one previously issued. Be sure to follow this program.

THE DIRECTORS MEETING WILL BE HELD ON APRIL 27 AT 9:30 A.M.—THE COMMODORE HOTEL, NEW YORK

THE PROGRAM

THURSDAY, APRIL 28TH

9:00 A.M. Registration Desk opens.

10:00 A.M. Morning Technical Session

INSULATED WIRE SECTION — CHAIRMAN: C. C. Lawson, Bell Telephone Laboratories, Inc.

"Hycar 2202, General Properties and Electrical Characteristics."
Mr. Gerard W. Kuckro, Advance Development Engineer, General Electric Company, and Mr. Howard Womack, Development Engineer, B. F. Goodrich Chemical Company.

"Kel-F—Insulation on Wires for High Temperature Applications."
Mr. Jules Jupa, M. W. Kellogg Company.

"Wire Insulated with 'Teflon' Tetrafluoroethylene Resin for High Temperature Uses."
Mr. Berten E. Ely, Polychemicals Department, E. I. Du Pont de Nemours & Co.

"Inorganic Fibrous Insulations for Wire."
Mr. E. Q. Harrigan, Continental Wire Company.

Afternoon Technical Session—2:00 P.M. promptly.

NON-FERROUS SECTION — CHAIRMAN: C. C. Lawson, Bell Telephone Laboratories, Inc.

"Repair of Cable Jackets Using Hot Gas Welding."
Messrs. Ross Pringle, Chief Engineer and Andrew Varenelli, Chief Chemist of the Ansonia Wire and Cable Company.

"Some Bending Characteristics of 70% Cartridge and 65% Yellow Brass Wire."
Messrs. Lewis E. Thelin, Assistant Chief Metallurgist, and Robert Abbott, Assistant General Foreman, Bristol Brass Company.

"World Supply and Price of Copper."
Mr. Bernard Aronson, President, Spencer Wire Company.

FERROUS SECTION — CHAIRMAN: Ralph L. Hartwell, Metal Textile Corp.

"Titanium—The Metal and the Industry."
Mr. Ward M. Minkler, Assistant Manager of Market Development, Titanium Metals Corporation of America.

"The Influence of Nail Design and Manufacturing Practices on Joint Strength."
Mr. Allan B. Dove, Research Department, Steel Company of Canada.

"Fabrication of Resistance Alloys."
Mr. William L. Stryker, Chief Process Engineer, Wilbur B. Driver Company.

6:00 Cocktail Party. Courtesy of the R. H. Miller Co., Homer, N. Y.

7:00 Dinner and Music.

Dinner will be over by 8:15 so that you can plan your own entertainment for the evening.

FRIDAY, APRIL 29TH

Morning Technical Session—At 8:30 A.M. promptly.

JOINT Ferrous and Non-Ferrous Meeting—

SYMPOSIUM ON ALUMINUM WIRE DRAWING — CHAIRMAN: Wm. D. Bawden, Gilbert & Bennett Mfg. Co.

"Aluminum Wire Drawing"
Mr. Roger J. Schoerner, Southwire Corporation.

"Dies for Drawing Aluminum Wire"
Mr. Edgar T. Miller, Wire Die Sales, Firth-Sterling, Inc.

"Aluminum Wire Drawing Lubricants"
Mr. William B. Bauzenberger, Apex Alkali Products Co.

"Filtering Lubricants for Aluminum Wire Drawing"
Mr. H. I. Jones, Hercules Filter Corporation

10:30 o'clock buses leave Commodore Hotel for General Cable Perth Amboy plant tour. Lunch will be served in the buses en route. It's your first chance to see this modern plant—DON'T MISS IT ! ! All persons must go by bus. No private cars may be used. To be admitted, ALL visitors must wear their Badges; no exceptions, please; buses will return you to Hotel by 5 o'clock.

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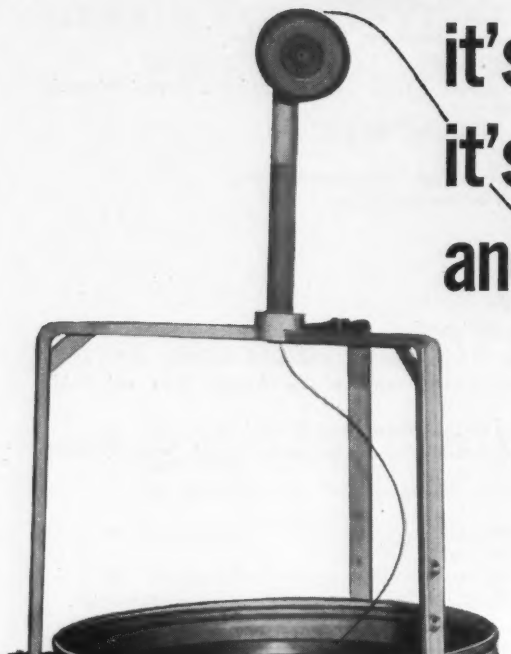

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Impressions of Scandinavia

by Clarence S. Arms
Consulting Engineer
Worcester, Massachusetts

Having been a member of the A.I.M. group that toured Scandinavia to observe the steel industries of that part of the world, Mr. Arms very kindly agreed to set down on paper an account of the group's activities. This article describes their interesting experiences in the Scandinavian countries.

On May 6, 1954, forty-four members of the Associated Industries of Massachusetts and their wives sailed from New York on the Swedish-American Line's new motorship M. S. Kungsholm for a six week tour through Scandanavia, West Germany, Holland, Belgium and France.

★ ★ ★

The object of this tour was to enable its members to see at first hand manufacturing techniques, labor conditions and social welfare programs in the countries visited. It was also hoped our visit would increase the friendship and improve the business relations between these countries and the United States. This being primarily an industrial tour we did not anticipate the elaborate social functions which were provided by our hosts throughout the entire trip.

★ ★ ★

At Gothenburg we left the Kungsholm. This ship is the last word in design and is staffed by a most efficient and courteous group of officers. They were the perfect hosts to the A.I.M. delegation. In Gothenburg we were first impressed with the beauty and bustling activity of the rock-bound harbor. We enjoyed watching several busy tug boats turn our 650 foot ship around in the narrow harbor before we came into the dock.

★ ★ ★

As we left the harbor for the Park Avenue Hotel we were impressed with the spotless cleanliness and order of streets, yards and parks. This same order and neatness was observed throughout our entire visit in Scandanavia.

★ ★ ★

Our first factory visits were on May fifteenth, when we went to the SKF Ball and Roller Bearing Factory and the Eriksberg Shipyard. SKF has its main office and principal plant in Gothenburg, with sixteen other plants throughout the world. Touring the SKF plant we saw high quality wire being used as the first step in the production of ball and roller bearings. The wire came from the S.K.F. wire mill and steel plant at Hofors. Controlling, as they do, the production of their raw material SKF is assured of the best quality of steel for the very exacting requirements of bearing manufacture.

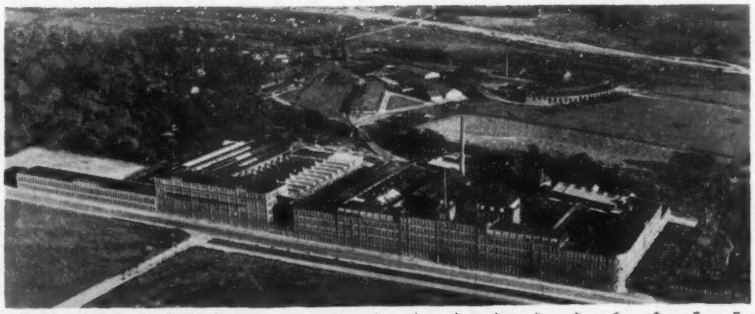
★ ★ ★

The wire first entered a powerful press where it was cut in small lengths and then pressed into a ball. Burrs are removed by rolling and grinding and after many grindings the ball is hardened and tempered. It then passes through numerous grinding and tumbling operations. The finished ball is now inspected for finish and graded, or measured, in a most ingenious machine to a tolerance of one thousandth of a millimeter. For very exacting requirements they can measure to plus or minus 20 millionths of a millimeter.

After a complete tour of the factories we spent some time in the laboratories and the showroom, where were displayed samples of all different kinds of roller bearings from the smallest, ¼" o.d. to one 4 feet in diameter. A most interesting exhibit of the roundness was a table about 8 feet long on which were placed five steel disks 10 inches in diameter and 4 inches thick. The upper surface of these disks had been ground convex and highly polished. They were spaced about 18 inches apart in a straight line on the table. A 3/16th inch ball was dropped from the ceiling of the room; striking the first disk it rebounded about four feet in the air and descended in an arc, landing on the next disk. This impact and rebound was repeated on each one of the disks until, after the last rebound, the ball dropped through a small hole at the end of the table.

Eriksberg

Our next visit was at the Eriksberg Shipyard. This yard celebrated its Centennial last year and is regarded as one of Sweden's finest shipyards. Founded in 1853 in a small foundry on the banks of the river Götha and employing 20 men, it has grown in 100 years to a huge yard with three concrete berths which will each accommodate hulls up to 35,000 tons dead-



S.K.F. Factory at Gothenburg

weight. In 1951 a record 600,000 tonnage was launched. Eriksberg boasts of the highest production per man of any shipyard in the world. The yard impressed us as being most modern and efficient. Large sections are assembled and welded before being moved to the final assembly point.

★ ★ ★

To complete an interesting and instructive day our party was given a most delightful banquet in an amusement park called "Lisberg Gardens." Our co-hosts were **Mr. Joel Larrson,** President of SKF and **Mr. Edwin Hakansson,** Vice-President of Eriksberg, with 30 members of the two companies and their wives.

Uddeholm

Leaving Gothenburg on Sunday, the A.I.M. party was fortunate in having the use of Sweden's "Land Cruise" Train as its home for the trip through Sweden. This was a de-luxe ten-car train furnished through the generosity of the Swedish State Railways.

★ ★ ★

Arriving at Karlstad on Monday morning our party spent the entire day visiting the extensive properties of the Uddeholm Company, producers of iron, steel, wood, paper and chemicals. Uddeholm owns 700,000 acres of land and forests. We travelled for miles through these forests which are kept free from underbrush and look more parklike than our American forests do. Each year a certain number of trees are harvested, the logs being floated down the rivers to the pulp mills.

★ ★ ★

Our first visit was to the new seamless tube plant being erected at Storfors. This is a most modern plant in every respect. It was designed in Germany and built at the Innocenti factory in Milan, Italy. The plant will have a capacity of about 100 tons per shift of sizes from 5/8 to 3 inches. Because of relatively low labor and manufacturing costs and a 15% per annum depreciation which is allowed by Swedish law, Uddeholm will be in an enviable position in the production of seamless tubing.

The old factory, in production since 1896, is adjacent to the new mill and, while it is far from modern, it still appeared to be quite efficient in layout and handling. It produces 40,000 tons per year of high quality product—5500 miles of tubing for bicycle frames being drawn a year. The open hearth department at Hagfors produces the billets for the tube plant at Storfors.

Strip Steel at Uddeholm's Munkfors plant.

At Hagfors the Uddeholm Company has large open hearth and electric steel furnaces producing 60,000 tons per year of steel by electric induction and 20,000 tons in the stationary open hearth. Much to our surprise we were told that the open hearth is used for their highest quality steel. Gas made from wood chips, being free of sulphur, makes it possible to produce steel with a sulphur content as low as .010. Careful control of the raw material, small units and excellent workmanship enables the Swedish industry to produce a superior quality of steel.

★ ★ ★

The blooming mills at Hagfors are modern in every particular, rolling billets for the tube and rod mills, strip and bars and also stainless steel for the finishing departments and hot rolled strip for their cold rolling plant at Munkfors.

★ ★ ★

Those of our party who were particularly interested in the iron and steel industry were very anxious to learn at first hand why Swedish steel is so pure and of such high quality. We had a fine chance to learn the reason at the blast, open hearth and electric furnaces operated by the Uddeholm Company.

★ ★ ★

The iron ore used comes from their mines in the Filipstad mining district. It is excellently suited to the production of high grade steels. The average analysis Iron 64%, Sulphur .003%, Phosphorus .005%.

★ ★ ★

The blast furnaces located at Hagfors are of the electric shaft type, charged with iron ore (which has been sintered, thereby further reducing the sulphur content) charcoal and limestone. The resulting pig iron made in these electric furnaces analyzes C=4.0%, Si = .5%, Mn = 1.0%, P = .020%, Sul.=.010%.

★ ★ ★

At Hagfors the Company has Bessemer converters, acid open hearth furnaces and both arc and induction electric furnaces. We could easily appreciate why Swedish steel is of a superior quality—its low metalloids being due to a fine quality of iron ore, electric blast furnaces using charcoal instead of coke, also relatively small tonnage open hearth and electric furnaces.

★ ★ ★

The blooming mill at Hagfors is a two high reversible type so designed that various sizes and shapes can be finished. It has an annual capacity of 100,000 tons. Here we noted again the care used to insure high quality steel. The billets from this mill were all pickled in acid, inspected and all surface defects ground out.

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There are also four finishing mills at Hagfors, rolling structural shapes, hot rolled strip, wire rods and merchant products.

★ ★ ★

Uddeholm's cold rolling plant is located at Munkfors. This plant dates back to 1670 and was purchased by Uddeholm in 1829. It has been in continuous production for the past 125 years. This plant is absolutely modern in every way—rolling mills, annealing furnaces and oil tempering. We were

Gauging Strip Steel Uddeholm's Munkfors mill.

interested to note that in both the annealing and tempering departments electric energy was used in the heating operation. Starting as they do with a superior quality of hot rolled strip and finishing in a most modern plant it is easy to understand why Munkfors Cold Rolled Strip is known wherever the highest quality steel is required.

★ ★ ★

Time did not permit our group to visit Uddeholm's Sponge Iron plant at Presberg, one of the largest producers of sponge iron in the world, since we were scheduled to spend the evening at the Uddeholm Manor, where Mr. Nils Danielsen, Uddeholm's president, was a most gracious host. We left Uddeholm's hospitality with a feeling that we had seen one of Sweden's finest examples of a large and far-flung enterprise, modern in every way, whose products are superior in quality and of world renown.

★ ★ ★

Travelling overnight in our special train we arrived the next morning at Lidköping to visit the Rörstrand Pottery Works. We were greeted at the station by a large group of school children who were given the morning out of school to get their first glimpse of Continental-style sleeping cars (and, to them, probably, a rather strange group of people.)

★ ★ ★

Rörstrand's plant at Lidköping was most interesting and modern, with its continuous production lines and semi-automatic machines. These machines could produce, for example, six thousand cups a day. The inspection tour ended in the Exhibition Halls where we saw rare and beautiful examples of ancient and modern pottery. Again our feeling was that we had seen a most modern manufacturing plant producing an exceptionally fine and beautiful product.

★ ★ ★

Our impressions of Scandanavia would be incomplete without mentioning the fine hospitality we were accorded throughout our entire visit. Rörstrand gives a fine example of this. After our trip through the factories we encountered our first Smörgäsbord. There we sampled typical Swedish fare, including reindeer meat, smoked eel and salmon trout. We were then taken to the country estate of **Fredrik Wehtje,** president of Rörstrand and lavishly entertained in his beautiful home.

Stainless Steel wire rods Uddeholm.

Our banquet that evening, arranged by Rörstrand, was one of the highlights of our entire trip. We arrived by bus in the evening at Moholm Manor and were greeted at the door by the owners in native costume and a group of children bearing nosegays of spring flowers for each member of our party. Thus welcomed, we were served a delicious banquet in a beautiful hall whose walls were decorated with red satin, a huge candelabra and the now familiar Rörstrand pottery. At each place was a dainty pottery vase bearing the menu and the date, which had been designed especially for the occasion at the Pottery. Instrumental and vocal music increased the pleasure of the banquet and placed us in a mellow mood for enjoying the entertainment furnished outdoors where airs from the Eighteenth Century were sung from a barge on the small stream running by the Manor, and then folk-dancing on the lawn by a group of young people in native costume. Thus the day ended. It was typical of the many similar festive occasions accorded our group during our Scandanavian tour.

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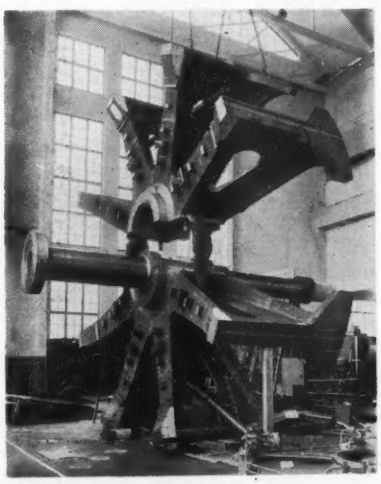
Our visit to the A.S.E.A. factory in Västeras was of particular interest as it is Sweden's largest industrial enterprise, employing 27,000 in its various plants. A.S.E.A. is a counterpart of our own General Electric Company. Here, we were told, had been built the world's largest double rotating turbines. They are installed in the Swedish Power Board's plant in Västeras. Production technique was modern in every way, but our interest was centered in the happy surroundings for the employees. Flowers were seen on many of the workbenches and in window boxes. The hospital, dental clinic and aptitude testing rooms gave the impression that A.S.E.A. was particularly interested in the physical



Rotary body at A.S.E.A. plant Vasteras being disassembled for shipment.

Part of the gardens available to employees Freia Chocolate Company.

* * * * *

and mental welfare of her people. This was further proven when we visited their Apprentice School. It is located in a park near the factory. Boys from 14 to 18 years of age live in A.S.E.A. homes, with a housefather and mother, attending company school in the morning and working in the factory in the afternoon. Labor shortage is a serious problem, and to increase its labor supply 700 Italians and Germans have been imported by the company.

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Our visits in Stockholm were most interesting. After being welcomed to the city by U.S. Ambassador **John Moors Cabot,** we inspected the L. M. Ericsson Telephone Company, the AGA Navigational Beacons and Sandviken Steel Company plant.

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The Ericsson factory was very modern. It is housed in a fine new building equipped with conveyor lines from which workers selected the necessary components as they passed their benches. Particularly outstanding was the quality control and frequent testing during assembly. This is required because so many components are assembled in one complete equipment. Cleanliness and order were conspicuous throughout the plant.

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AGA (Gas Accumulator Company) was our first introduction to a factory underground. 70,000 square feet have been blasted out of rock to provide bomb protection and air conditioned space for manufacturing their most vital units.

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Gustav Dalin, who received the Nobel Prize in Physics, invented most of their automatic beacons after he had been made completely blind by an explosion in his laboratory.

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The Sandviken Steel Works we found quite similar to the Uddeholm plant described earlier. Sponge iron is an important product at Sandvik—the finished iron being 90% pure and a fine raw material for both the open hearth and electric furnaces.

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In Oslo, Norway the Freia Chocolate Factory was enjoyed by all. They use 700 tons of chocolate a year to produce the 100 different items on automatic machines and packaging equipment. We were especially delighted with the reception given us in what is probably the finest garden in all Scandanavia. Here we found a three acre park, adjoining the factory, surrounded by a high wall. Fountains, terraced gardens, statuary and a wealth of beautiful flowers made us think we were in some royal garden, rather than one furnished for the use of the workers. This again proved to us how much thought is given to social service and pleasant working conditions in these countries.

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We found Norway concentrating on those industries which depend on large amounts of cheap hydro-electric power. On our delightful trip up the Hardangerfjord we saw numerous pipe lines coming down the mountainsides from lakes above, supplying almost unlimited water power for the electro-chemical and electro-metallurgical smelting plants on the shores of the fjord.

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Our visits in Copenhagen, Denmark, were to three quite different types of industry: The Bing and Grondahl Porcelain plant, The Burgmeister and Wain Diesel and Ship Yard and the Peter F. Heering Distillery, producers of famous Cherry Heering.

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Bing and Grondahl was voted one of the most interesting plants visited by the ladies of our party. About 1200 workmen were seen producing exquisitely beautiful figurines. Each man works in a separate booth and all are true artists. Their products are famous throughout the world wherever fine china and figurines are treasured.

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To the mechanically minded and engineers the Burgmeister and Wain plant was an eye-opener. Here we saw being produced their famous diesel engines and were surprized at their tremendous size. One, on the assembly floor, was three stories high. We saw pictures of the largest diesel ever built—a 22,500 H.P. monster now installed in the Copenhagen municipal power plant. Here again we found an apprentice school with 200 youths enrolled in a four year training course; also excellent provisions for the health and recreation of employees and their families were seen.

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Further inspections of manufacturing techniques abroad were made in the plants of the I.B.M. and the Ascher Diamond Works in Amsterdam, Holland and the Simca and Norton Grinding Wheel

(*Please turn to page* 480)

Hot Dip Galvanizing Is a Science

by Wallace G. Imhoff, President
The Wallace G. Imhoff Company
Los Angeles, California

Part III

In this series of articles on hot dip galvanizing the author discusses the several principles as they affect the quality and cost of the finished products. Since more than one galvanizing principle is operating at the same time, Part III has been written to show how the gage of the base metal and the length of time of submersion in the galvanizing bath act separately. In the preceding installment it was shown that the heavier the gage of the base metal, the heavier the deposit of zinc as coating. This installment separates the gage factor from that of submersion time.

Anyone who has spent a few years as a practical galvanizer gradually becomes conscious of the fact that there are many opposing forces always in action. Ordinarily these hidden, or unseen forces are called variables, but the more familiar a galvanizer becomes with the results of these opposing forces, or variables, upon the finished product, the more clearly it is seen that successful galvanizing operations are really based on very definite scientific principles. If these principles are clearly understood, costs go down, production goes up, and the quality of the product is high; and exactly the opposite is true, when these definite scientific principles are not understood, production is low, quality is poor, excessive by-products are made, and costs are high.

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Three of these principles have already been discussed in previous articles; the fourth is, "it is a definite galvanizing principle, that the longer the submersion time, the heavier the zinc will be deposited as galvanized coating." The reason it is so hard to clearly see and understand each principle, is because there are many other factors and principles in operation at the same time; some of these opposing forces are operating with the principle, and other opposing forces are operating against it. These may be summarized into a general statement that there are many factors, and many principles, all operating at once; and some of these principles operate in one direction, while other principles operate in the other direction tending to nullify the first set of principles.

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An attempt will be made to show how many factors affect each individual principle, thus confusing and making the whole question far more complicated. Keeping the principle in mind, "that the longer the submersion time, the heavier the zinc will be deposited as galvanized coating," the actual amount of zinc deposited as galvanized coating will be different for a steel base metal, a wrought iron base metal, a malleable iron base metal, and a cast iron base metal. Another auxiliary factor of great importance is the thickness, or gage of the steel base, and the thickness and weight of the sections of malleable iron, wrought iron, or cast iron. Ship plates may be an inch or more in thickness; water pails are made with a 28 gage body, and a 30 gage bottom section. Another factor is the gage of wire, the kind of steel in the wire; the size and shape of the article, such as sprinkling cans compared to hot water tanks.

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There is considerable difference in hot dip galvanizing two-inch steel pipe, as compared to galvanizing one-quarter inch pipe; and a fire pail may have a steel body with malleable iron handles; a light gage steel pail may have a heavy wire inside the top rim. Some kinds of articles are immersed into the zinc bath in bundles, such as pole-line hardware and pipe; others are immersed singly, or one at a time, such as pails, ash cans, hot water tanks, garbage cans, and many other kinds of miscellaneous articles, while still others, such as wire, fence, etc. are continuously galvanized. The basic galvanizing principles are all in operation, but secondary factors and causes, may change the end results, or nullify them almost entirely. The handling methods and the equipment used may intensify, or prolong the operation of some principles, and retard, and suppress other opposing principles.

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Increasing the intensity of some principles and retarding the effects of other principles may have a drastic effect on the amount of by-products produced, and the quality and the finish of the product, as well as having a direct bearing on the production. All distortion, or interference in the free operation of the normal galvanizing principles vitally increases costs, so that once again attention is called to the fact, that the lowest galvanizing costs are obtained when all principles are working harmoniously for the given conditions at hand. Since one, two, or more galvanizing principles may be operating to accomplish the same results, it is sometimes extremely difficult to discover just what results the individual principles are producing. As an example, a previous principle was, "the higher the bath temperature, the heavier the zinc will be deposited as galvanized coating."

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At this time we are also discussing the principle, that "the longer the submersion time, the heavier the zinc will be deposited as galvanized coating." We have also seen there is still another galvanizing principle, "the heavier the gage of the base metal, the heavier the zinc will be deposited as galvanized coating." Here are three galvanizing principles that state "the heavier the zinc will be deposited as coating." But, all of the

principles may not be operating in the same direction, the temperature of the bath may be high, the submersion time may be too short, and the gage of the base metal may be too light. Any one of the three principles may be opposing the other two. However, when two, or more principles are in operation at once at one time, it is impossible to tell whether one, or both of the principles are producing the results, or what result each individual principle is producing. This is illustrated in the following table 1 where both bath temperature and submersion time are involved in the final results.

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It is impossible to state whether the increase of weight of zinc deposited is caused by the higher temperature, the submersion time, or the withdrawal time. There are three variables, and three galvanizing principles involved in the results obtained; thus in order to discover the affect of each one separately, the other two have to be standardized, or held constant, while the third variable is changed. It is known that the higher the production, the higher the bath temperature must be, and yet we are confused by the fact that when galvanizing ship plates, the production in pounds is high, and the bath temperature is low because of the plate thicknesses. A high bath temperature, leaves a high residual heat in the plates which when drawn out of the bath, and exposed to the air, burns the zinc coating off the plates; so here we have the opposite results.

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The table in itself is nothing but raw, cold figures. If the figures in the table are based on quality of the product, zinc deposited as galvanized coating, and lowest costs, then everything changes and the results appear in an entirely different practical light. The very highest quality product was found to be obtained at a production of 20.7 dozens per hour, which gives an operating bath temperature of 840 degrees F., a submersion time in the bath of 14.7 seconds, a withdrawal time of 7.4 seconds, and zinc deposited 65.7 pounds per gross. These figures give lowest costs of production, with highest quality.

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Since many companies do not operate on a highest quality basis, especially in periods of high business activity, their production and sales are based on what quality the consumer will accept, and in most cases the consumer will accept a quality much below the highest in abnormal times of business, when articles are scarce, such as right after a war ends. Volume production is substituted for quality production, because it is a seller's market.

TABLE 1

Five Variables - An increase in Production results in an increased weight of zinc deposited as galvanized coating, and must be accompanied by an increase of bath temperature.

Bath Temperature	Submersion Time Seconds	Withdrawal Time Seconds	Production Dozens per Hour	Weight of Coating; lbs. per Gross
800 Degrees F.	24.0	11.5	12.5	60.0
805 " "	22.8	11.0	13.5	61.0
810 " "	21.7	10.5	14.5	61.5
815 " "	20.6	10.0	15.6	62.3
820 " "	19.4	9.5	16.6	63.0
825 " "	18.2	9.0	17.7	63.7
830 " "	17.0	8.5	18.7	64.4
835 " "	15.9	7.9	19.7	65.0
840 " "	14.7	7.4	20.7	65.7
845 " "	13.5	6.9	21.8	66.4
850 " "	12.4	6.4	22.8	67.1
855 " "	11.2	5.8	23.8	67.8
860 " "	10.0	5.3	24.8	68.5
865 " "	8.9	4.8	25.9	69.2
870 " "	7.7	4.3	26.9	70.0
875 " "	6.5	3.7	27.9	70.7
880 " "	5.4	3.2	28.9	71.3
885 " "	4.3	2.7	29.9	72.0
890 " "	3.1	2.2	31.0	72.6
895 " "	2.0	1.6	32.0	73.3
900 " "	0.9	1.1	33.0	74.0

From a scientific viewpoint, during these periods most scientific principles are violated; profits become the main incentive, and the articles sell because they are scarce. During such periods of scarcity, companies that normally produce high quality products are often forced by competition to lower standards in order to maintain sales volumes. The whole basis of TABLE 1 therefore reverts back to the quality that the consumer will accept, and the quality that different galvanizing companies use as their standard. The table furnishes the operating facts; business conditions and company standards determine what production procedures are used.

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It has been pointed out above that there are five variables in TABLE 1. The Submersion Time varies from 24 seconds in the bath, down to .9 of a second. This table alone indicates that "the shorter the submersion time, the heavier the zinc will be deposited as galvanized coating," and scientific tests with the submersion time alone as the variable, show conclusively that the correct galvanizing principle is exactly the opposite, namely, "the longer the submersion time, the heavier the zinc will be deposited as galvanized coating."

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Definite scientific galvanizing principles can only be established, when one variable is operated at a time, and all of the other variables, are controlled. In order to determine the exact scientific galvanizing principle in so far as submersion time is concerned, this was done; garbage cans were selected for the test, and the operations were made on a practical plant routine production basis; the submersion time was definitely controlled at 0.20, 0.40, 0.60, 0.80, and 1.00 minute; the bath temperature was standardized for all tests and held at 875 degrees F., the quantity used in each test was 72 garbage cans, and all variables were standardized except the submersion time.

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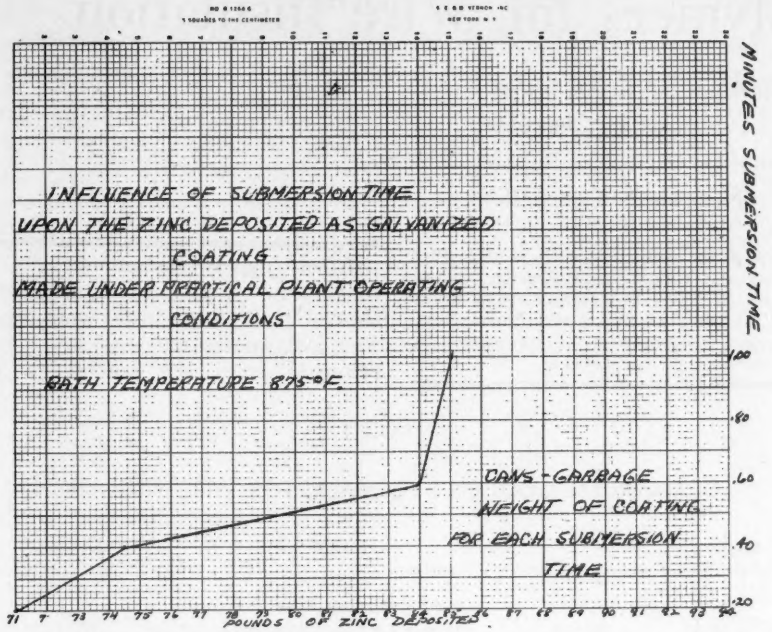
The purpose of this test was to



establish under practical operating plant conditions, how the weight of zinc deposited as galvanized coating, is affected by increasing the submersion time in the galvanizing bath. The results of the test are shown in TABLE II.

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There can be no doubt now about the effect of the submersion time upon the weight of zinc deposited as galvanized coating. This practical plant test has established the principle that, "the longer the submersion time in the molten zinc, the heavier the zinc will be deposited as galvanized coating." This is exactly opposite to what is shown in TABLE 1. Therefore in TABLE 1 the principle of submersion time is an opposing principle, and does not operate as shown in TABLE 1. This illustrates very clearly why the practical galvanizer was often wrong in his conception of how the principles operated; it was not until research investigations proved that "the higher the bath temperature, the heavier the zinc will be deposited as galvanized coating," that he believed it. Before that time the entire industry believed that by raising the bath temperature, the zinc coating was lightened. The erroneous belief was due to the many variables involved. Laboratory investigations pointed the way the different principles operated, but it took actual plant verification tests to prove to the whole industry, that the principles found in the laboratory under controlled conditions, were correct.

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The next graph shows (See p. 489) "that the longer the submersion time, in the zinc bath, the heavier the zinc will be deposited as galvanized coating." Particular attention at this time is called to the difference that sometimes occurs in making laboratory tests, and in making plant tests under the usual operating conditions. In laboratory tests errors often produce an irregular graph, causing the researcher to insert a dotted line through points tending to show the full smooth line of results.

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The graph resulting from the actual plant tests made on five sets of garbage cans is a true graph, without errors, so that no dotted line has been super-imposed. It thus becomes a necessity to explain the graph as found; the explanation will also help to understand more clearly the basic scientific principle cited — namely, that, "the longer the submersion time, the heavier the zinc will be deposited as galvanized coating."

TABLE 11

ARTICLE TESTED - CANS GARBAGE
BATH TEMPERATURE - 875 DEGREES F.

Lot Number	1	2	3	4	5
Started	3.50	3.06	2.00	12.35	10.25
Stopped	4.20	3.50	2.59	1.45	11.50
Time	30	44	59	70	85
Time out	0	7	15	lunch 30	6
Quantity	72	72	72	72	72
To Flux Box	Same time for all lots				
Through Flux Box	Same time for all lots				
SUBMERSION TIME	0.20	0.40	0.60	0.80	1.00 Minute
Withdrawal Time	Same time for all lots				
To Pile	Same time for all lots				
Dry Pickled	271	271	271	271	271
Galvanized	342	345.5	355	355.5	356
Zinc Deposited	71 lbs.	74.5 lbs.	84 lbs.	84.5 lbs.	85 lbs.

Before alloying action can take place, the base metal must reach the same temperature as the galvanizing bath temperature; that takes time, depending on the thickness, or the gage of the base metal. In the tests all gages were the same. In the first group of 72 cans with a submersion time of only 0.20 of a minute, there was not enough time for the base metal to

(*Please turn to page* 487)

Cold GR-S Polymers for Wire Insulation

by Dr. L. H. Howland, Dr. R. W. Brown and C. W. Lawson
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This paper was delivered at the 1954 Wire and Cable Symposium in Asbury Park, N. J., on December 8, 1954, under the auspices of the Signal Corps Engineering Laboratories. It is published by permission of the authors.

The well-defined improvement in tire tread wear of GR-S polymers prepared at low temperatures has stimulated interest in these materials for use in other applications, including wire insulation. During the past several years a number of experimental polymers designed specifically for use on wire have been prepared at low temperatures by synthetic rubber development groups and tested by wire manufacturing companies and the Signal Corps. As a result of this cooperative program three cold polymers for wire insulation have come into commercial production. Table I lists these polymers and their hot counterparts.

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All of the cold wire insulation polymers are non-staining and non-discoloring on aging when exposed to sunlight. They contain Polygard as stabilizer, which is one of the most powerful of the presently known non-staining stabilizers for GR-S. The 1503 and 1504 polymers were designed to be improvements over GR-S 1016 and 1023, respectively, and need no special comment. GR-S 1708 is like 1503 except that it is made to a higher Mooney viscosity and then mixed with 37.5 parts of processing oil (Circosol 2XH) before coagulation. The resulting oil masterbatch has a Mooney viscosity of 60. This polymer represents an effort to bring to the wire trade the cost advantages which have been found for these oil masterbatches in tire manufacture. The basic formulation of all these polymers is very similar. A typical recipe[1] is shown in Table II.

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The polymerization recipe is similar to that used for the production of hot GR-S except that a peroxamine[2] catalyst system has been substituted for the persulfate used in hot GR-S in order to give sufficiently rapid polymerization rates at the low temperature.

After polymerization to 60% conversion, the dithiocarbamate shortstop is added to prevent further polymerization, the latex is removed from the reactor to a blow down tank where the unreacted butadiene is flashed off, then to a stripper where the unreacted styrene is removed by steam distillation. Next, the latex (about 25% solids) goes to a blend tank

TABLE I

COMMERCIAL COLD GR-S POLYMERS FOR WIRE INSULATION

Designation of 41°F. GR-S	Butadiene/Styrene	Remarks	Corresponding Hot GR-S
1503	70/30	General Purpose Wire Polymer	1016
1504	84/16	Polymer for Low Temperature Service	1023
1708	70/30	Oil Extended Polymer (high Mooney viscosity GR-S 1503)	—

TABLE II

POLYMERIZATION RECIPE FOR COLD GR-S FOR WIRE

Charge Formula	
Butadiene	70 (86 for GR-S 1504)
Styrene	30 (14 for GR-S 1504)
Water	180
Potassium Fatty Acid Soap	4.7
Potassium Chloride	0.4
Tamol N	0.10
Ferrous Sulfate Heptahydrate	0.003
Diethylene Triamine	0.08
Paramenthane Hydroperoxide	0.19
t-Dodecyl Mercaptan	0.2 (lower for GR-S 1708)
Shortstop	
Sodium Dimethyl Dithiocarbamate	0.10
Polyamine H	0.05
Stabilizer	
Polygard	1.25 (on polymer)
Reaction Temperature	40-43°F.
Conversion	60%
Mooney Viscosity (ML-4 at 212°F.)	52
Coagulation	Glue-Acid
Dewatering	S.P.

TABLE III

METHODS FOR OBTAINING LOW WATER ABSORPTION POLYMERS

Process	Original Polymer	Present Designation
Good Washing*	—	—
Alum Coagulation	GR-S AC	GR-S 1004
Acid-Glue Coagulation*	GR-S 65	GR-S 1016
Wet Tubing*	GR-S SP	GR-S 1016
Dilution before Coagulation	GR-S X-431	—
Dilution plus Wet Tubing	GR-S X-445	—

** Used in present commercial cold polymers for wire insulation.*

TABLE IV

RELATIVE USAGE OF HOT AND COLD GR-S FOR WIRE

GR-S	Type (Hot or Cold)	% of Total†
1503	Cold	54
1504	Cold	3
1007	Hot	11
1016	Hot	11
1019	Hot	21
Total % Cold		57‡
Total % Hot		43‡

† Estimated from production figures — February-October, 1954, omitting GR-S 1018. No GR-S 1023 was produced in this period.

‡ If GR-S 1018 (cross-linked), for which there is no cold counterpart is included, the percentages are 46% cold and 54% hot.

TABLE V

COMPARISON OF HOT AND COLD GR-S IN PERFORMANCE GRADE COMPOUND

	GR-S 1016 (Hot)		GR-S 1503 (Cold)	
Press Cure Time, Min. at 287°F.	10′	20′	10′	20′
Tensile, psi.	1055	1215	1470	1470
Elongation, %	495	425	650	540
200% Modulus, psi.	615	735	515	570
Set, inches	5/16	5/16	¼	¼
Aged Properties (96 hrs. Oxygen Bomb at 70°C. and 300 psi.)				
Tensile, psi.	1150	1150	1580	1422
% of Original	109	94.5	107	97
Elongation, %	365	365	510	460
% of Original	74	86	78	85
Brittle Point, °C.	−40	−43	−40	−39

where several batches are mixed for uniformity. Stabilizer is added and the latex is flocculated, washed and dried. These last steps are extremely important in the production of polymer for electrical uses[8], and it is here that the procedures differ most from those employed in standard polymers for use in other industries.

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For production of standard polymers, the latex is creamed by addition of salt to control the final crumb size and then flocculated with sulfuric acid. Although the polymer crumb is washed before drying, the dried rubber normally contains some water soluble ash, which has no effect on its physical properties but is undesirable in wire polymers. The latter are flocculated with a mixture of glue and sulfuric acid, the glue serving to control the size of the flocculated crumb. The wet crumb is then tubed, which mechanically reduces the moisture content from about 40% to as low as 5-10% of the wet crumb, thus removing a large part of whatever water solubles may be present. The final rubber contains about 0.06% or less of water soluble ash and normally gives water absorption of less than 1 mg. per square cm. of surface (20 hours at 70°C.). Total ash is usually in the range of 0.1% compared to about 0.7% for other GR-S polymers.

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Table III lists some of the most important methods that have been employed to produce polymers with low water solubles. Also listed in the last column are the hot GR-S polymers that first employed the various procedures. The three features marked with the asterisk are those used in making the present cold wire insulation polymers. The alum method of coagulation also adds much less electrolyte to the system than the salt-acid procedure but it gives slow curing rubber. The dilution method produces still lower water soluble ash but the products using these

TABLE VI

RH-RW INSULATION

Meets the Underwriters Laboratories Standards for Physical Properties

GR-S 1503	85.00
GR-S 1018	15.00
Zinc Oxide	45.00
Calcined Hard Clay	100.00
Natural Whiting	25.00
Mineral Rubber 300°F.	35.00
Zinc Laurate	1.00
Protective Wax	4.00
Blend of Diarylamine — Ketone Reaction Product with N,N′diphenyl-p-phenylene Diamine	1.00
p(p-Tolyl Sulfonyl Amido)Diphenylamine	1.00
Diphenylamine-Acetone Reaction Product	1.00
Litharge	1.50
Zinc Mercaptobenzothiazole	3.00
Diphenyl Guanidine	1.00
Tetramethyl Thiuram Monosulfide	1.50
Sulfur	0.65
Total	320.65
Specific Gravity	1.56
Mooney Scorch @ 250°F.	
Scorch Time	16′ 15″
Cure Rate	7′ 30″

Tubing Data Based on Garvey Die

125.0 Grams Per Minute
45.3 Inches Per Minute
21.6% Swell Per ¼″ Thickness

Test Specimens cured in flash vulcanizer at 240 p.s.i. steam (402°F.)

UNAGED PHYSICAL PROPERTIES

Seconds @ 402°F.	200% Modulus psi	Tensile psi	Elongation %	Recovery Inches	Shore Hardness "A"
10	180	190	500	0.96	55
15	230	540	950	0.40	58
20	270	780	920	0.32	58
25	310	870	880	0.28	61
U. L. Standard	—	700 Min.	300 Min.	0.375 Max.	—

TABLE VI (Continued)

PHYSICAL PROPERTIES AFTER AGING 20 HRS. IN AIR BOMB @ 127°C. & 80 PSI

Seconds @ 402°F.	200% Modulus psi	Tensile psi	Elongation %	Recovery Inches	Shore Hardness "A"
10	400	700(368%)	500(100%)	—	69
15	390	760(141%)	520(55%)	—	70
20	370	860(110%)	550(60%)	—	70
25	410	830(95%)	490(56%)	—	73
U. L. Standard % Retained	—	50% Min.	50% Min.	—	—

PHYSICAL PROPERTIES AFTER AGING 168 HRS. IN OXYGEN BOMB @ 80°C. & 300 PSI

10	210	480(252%)	850(170%)	—	58
15	230	480(89%)	710(75%)	—	64
20	240	860(110%)	810(88%)	—	64
25	250	860(99%)	760(86%)	—	64
U. L. Standard % Retained	—	50% Min.	50% Min.	—	—

MECHANICAL WATER ABSORPTION — AFTER 7 DAYS IN 70°C. WATER

Seconds @ 402°F.	Grams Per Square Inch
10	0.017
15	0.016
20	0.015
25	0.016
U. L. Standard	0.020 Max.

ELECTRICAL WATER ABSORPTION ASTM D-470 — 1000 CYCLES

Slabs Press Cured 6 Minutes @ 60 psi (307°F.)

	Specific Inductive Capacity — Dry	Specific Inductive Capacity — 1 Day	Increase in Specific Inductive Capacity — 1-14 Days	Increase in Specific Inductive Capacity — 7-14 Days
	3.49	3.42	5.5%	0.75%
U. L. Requirements	—	6.0 Max.	10% Max.	3.0 Max.

TABLE VII

CODE WIRE INSULATION

Meets the Underwriters Laboratories Standards for Type R for Physical Properties

GR-S 1708	100.00
Zinc Oxide	5.00
Litharge	1.50
Hard Clay	120.00
Natural Whiting	80.00
EPC Black	20.00
Mineral Rubber 300°F.	60.00
Protective Wax	5.00
Diphenylamine-Acetone Reaction Product	1.25
Zinc Mercaptobenzothiazole	3.00
Tetramethyl Thiuram Monosulfide	1.50
Sulfur	1.75
Total	399.00
Specific Gravity	1.50
Mooney Scorch @ 250°F.	
Scorch Time	7′ 15″
Cure Rate	3′ 45″

Tubing Data Based on Garvey Die

114.9 Grams Per Minute
52.8 Inches Per Minute
15.0% Swell Per ¼″ Thickness

Test Specimens cured in flash vulcanizer at 240 psi steam (402°F.)

UNAGED PHYSICAL PROPERTIES

Seconds @ 402°F.	200% Modulus psi	Tensile psi	Elongation %	Recovery Inches	Shore Hardness "A"
10	350	810	600	0.40	65
15	450	1020	560	0.32	69
20	450	1000	550	0.30	68
25	450	1030	540	0.30	68
U. L. Standard	—	500 Min.	200 Min.	0.50 Max.	—

techniques, which added cost, were required for so few specialty applications and in such low volume that their manufacture was discontinued.

★ ★ ★

Although the improvements in properties of low temperature GR-S have perhaps not been as great in many wire compounds as in tires (probably due to the use of non-carbon black stocks in the former), they have been sufficient to cause a shift of about 50% of the GR-S usage to the cold polymers. Table IV shows the approximate percentages of the various hot and cold wire polymers which were produced from February to October of 1954. If GR-S 1018 (cross-linked), for which there is no cold counterpart, is omitted from the figures about 57% of the GR-S used for wires is of the cold variety, while inclusion of 1018 in the figures drops the amount to 46%. GR-S 1708, although it is classed as a wire polymer, is not included in these figures since it is also used for other purposes and the amount going into wire compounds at present is probably rather small.

★ ★ ★

Table V shows a comparison of physical properties of GR-S 1016 and 1503 in a typical clay filled performance grade compound. The superior tensile properties of the cold polymer both before and after aging are evident. These data were obtained by the Wire and Cable Department of the United States Rubber Company.

★ ★ ★

Similar comparisons between 1504 and 1023 show about the same tensile advantages. However, due to the increased molecular regularity caused by low temperature polymerization, the 1504 has somewhat more tendency to stiffen at low temperature than does 1023. In general the choice of one or the other of these polymers will depend on whether physical properties or extreme resistance to low temperature is the more important. Also, blends of the two may be used to obtain intermediate physical and low temperature properties.

TABLE VII (Continued)

PHYSICAL PROPERTIES AFTER AGING 96 HRS. IN OXYGEN BOMB @ 70°C. & 300 PSI

Seconds @ 402°F.	200% Modulus psi	Tensile psi	Elongation %	Recovery Inches	Shore Hardness "A"
10	450	750(93%)	480(80%)	—	—
15	470	750(73%)	450(80%)	—	—
20	510	800(80%)	410(74%)	—	—
25	530	820(80%)	410(76%)	—	—
U. L. Standard % Retained	—	75% Min.	65% Min.	—	—

TABLE VIII

INSULATION FOR ARCTIC SERVICE

GR-S 1504	100.00
Zinc Oxide	15.00
Hard Clay	165.00
Titanium Dioxide	10.00
Protective Wax	3.00
Zinc Laurate	1.75
Coumarone Indene Resin	15.00
Process Oil	10.00
Low Temperature Diphenylamine—Acetone Reaction Product	1.75
Zinc Mercaptobenzothiazole	3.00
Tetramethyl Thiuram Monosulfide	2.00
Diphenyl Guanidine	1.00
Sulfur	0.25
Total	327.75
Specific Gravity	1.64
Mooney Scorch @ 250°F.	
Scorch Time	18′ 30″
Cure Rate	6′

Tubing Data Based on Garvey Die

115.5 Grams Per Minute
40.3 Inches Per Minute
21.2% Swell Per ¼" Thickness

Test Specimens cured in flash vulcanizer at 240 psi steam (402°F.)

UNAGED PHYSICAL PROPERTIES

Seconds @ 402°F.	200% Modulus psi	Tensile psi	Elongation %	ASTM Set Inches	Brittleness ASTM D746-51T —65°F. in air	Shore Hardness "A"
10	210	350	410	0.28	OK	59
15	340	450	390	0.20	OK	63
20	360	930	750	0.20	OK	63
25	350	930	770	0.20	OK	62

PHYSICAL PROPERTIES AFTER AGING 20 HRS. IN AIR BOMB @ 127°C. & 80 PSI

Seconds @ 402°F.	200% Modulus psi	Tensile psi	Elongation %	ASTM Set Inches	Brittleness ASTM D746-51T —65°F. in air	Shore Hardness "A"
10	740	870(249%)	370(90%)	—	—	72
15	730	1000(222%)	380(98%)	—	—	73
20	700	1010(109%)	410(55%)	—	—	73
25	720	1090(117%)	460(60%)	—	—	73

PHYSICAL PROPERTIES AFTER AGING 168 HRS. IN OXYGEN BOMB @ 80°C. & 300 PSI

Seconds @ 402°F.	200% Modulus psi	Tensile psi	Elongation %	ASTM Set Inches	Brittleness ASTM D746-51T —65°F. in air	Shore Hardness "A"
10	630	730(209%)	300(73%)	—	—	66
15	630	830(184%)	310(79.5%)	—	—	68
20	620	1140(123%)	480(64%)	—	—	68
25	630	1100(119%)	410(53%)	—	—	66

In Tables VI through X are collected several compounding recipes and cure data for typical wire stocks using cold GR-S polymers.

Summary

Several cold GR-S polymers have been prepared and tested for use as insulating and jacketing materials for wire. Three of these have reached the production stage. The improvements of cold over hot GR-S, while perhaps not as great as in tire tread stocks, are sufficient to have caused a change of about 50% of the wire insulation polymer production from the hot to cold types.

Acknowledgment

The polymer development work reviewed in this paper was sponsored by the Reconstruction Finance Corporation, Office of Synthetic Rubber, in connection with the Government synthetic rubber program. The authors wish to thank that agency for permission to present this paper. They also wish to thank Mr. W. H. Dibble and his staff at the Wire and Cable Department of the United States Rubber Company for their aid in supplying vulcanizate data given in Table V and for their helpful general comments.

★ ★ ★

References

1. **Howland, L. H., Neklutin, V. C., Provost, R. L. and Mauger, F. A., Ind. Eng. Chem. 45, 1304-11 (1953).**
2. **Madigan, J. C., Howland, L. H. Burns, E. R., and Bawn, C. V., ibid., 40, 2384-87 (1948).**
3. **Whitby, G. S., Wellman, N. Floutz, V. W., and Stephens, H. L., ibid., 42, 445-56 (1950).**

(*Please turn to pages 464A and 464B for Tables IX and X, respectively.*)

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The 1955 edition of this directory contains thousands of changes—new names, new products, new addresses and many other corrections and deletions.

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Government Wire Production Information

The New Census of Manufacturers

The Bureau of the Census, Washington 25, D. C., has mailed census report forms to approximately 2½ million firms for information on their 1954 operations.

★ ★ ★

As the results to be tabulated from the information received are important to everyone in business and are of value only to the degree that returns are accurate and complete, every company in the wire industry is urged, if it has not yet been done, to fill out their census forms promptly and return them to the Bureau.

★ ★ ★

As this is the first complete census to be taken on industry since 1947 and since facts and figures have changed materially in the last seven years, these reports will be highly useful in helping business concerns to know where our industry stands today. Your full co-operation is solicited.

Number of ASA Standards Grows

There are now 1440 American Standards in use in the United States according to the annual report of the **American Standards Association.**

★ ★ ★

The number of American Standards approved in 1954, was 152, according to **Vice Admiral George F. Hussey, Jr.,** USN (ret.), managing director of the American Standards Association, who made the report. Of these, 64 were new standards, 88 were revisions. The greatest number of new standards was in the electrical field.

★ ★ ★

Among the electrical standards adopted or revised in the last year are the following:

C8.22-1954 (ASTM D 470-52T)
Methods of Testing Rubber Insulated Wire and Cable

C8.23-1954 (ASTM D 755-52T)
Specifications for Performance Synthetic Rubber Compound for Insulated Wire and Cable

C8.24-1954 (ASTM D 754-52T)
Specifications for Heat-Resisting Synthetic Rubber Compound for Insulated Wire and Cable

C8.25-1954 (ASTM D 532-49)
Specifications for Rubber Sheath Compound for Electrical Insulated Cords and Cables

C8.26-1954 (ASTM D 353-52T)
Specifications for Performance Rubber Compound for Insulated Wire and Cable

C8.27-1954 (ASTM D 469-52T)
Specifications for Heat-Resisting Rubber Compound for Insulated Wire and Cable

C8.28-1954 (ASTM D 866-46T)
Specifications for GR-S Synthetic Rubber Sheath Compound for Electrical Insulated Cords and Cables

C8.29-1954 (ASTM D 574-46T)
Specifications for Ozone-Resistant Type Insulation for Insulated Wire and Cable

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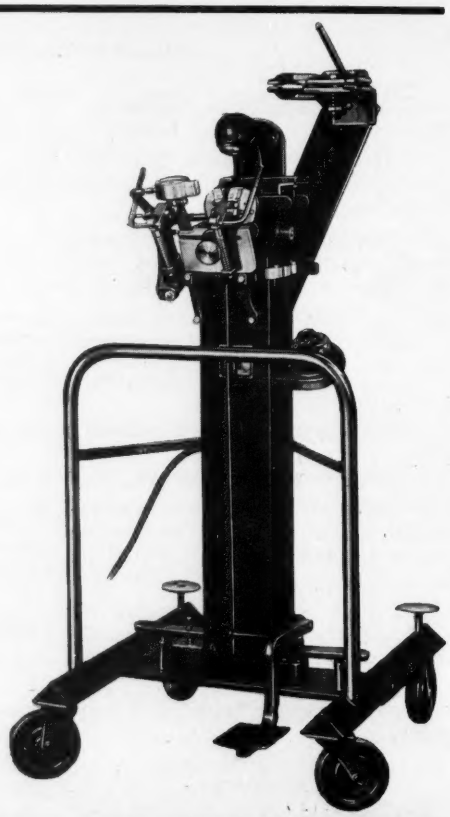

C8.30-1954 (ASTM D 734-50T)
Specifications for Polyvinyl Insulating Compound for Insulated Wire and Cable

C8.31-1954 (ASTM D 753-49)
Specifications for GR-M Polychloroprene Sheath Compound for Electrical Insulated Cords and Cables Where Extreme Abrasion Resistance is not Required

C8.32-1954 (ASTM D 752-49T)
Specifications for GR-M Polychloroprene Sheath Compound for Electrical Insulated Cords and Cables

C8.33-1954 (ASTM D 1047-49T)
Specifications for Thermoplastic Vinyl Polymer Sheath Compound for Electrical Insulated Cords and Cables

C8.34-1954
Specifications for Weather-Resistant Wire and Cable, Neoprene Type

★ ★ ★

The American Standards Association is the national clearinghouse for voluntary engineering, industrial and consumer standards. It is made up of 115 technical societies, trade associations, consumer groups, and 2300 individual member companies. ASA is the United States member of the International Organization for Standardization (ISO.)

California Reinforcing Roads With Wire Fabric

California has joined the growing list of states experimenting with the use of welded wire fabric and other steel reinforcement for control of reflection cracking in bituminous resurfacing. In 1954 the state's Division of Highways resurfaced a mile-long stretch of the westbound lane of Route U. S. 40 near Vallejo, using variously, welded wire fabric, bituminous road mesh, and expanded metal mesh in separate test sections.

★ ★ ★

The experimental project, conducted by the Division of Highway's Materials and Research Department headed by **F. N. Hveem,** was under the immediate supervision of District Ten Highway Engineer **John Meyer.**

★ ★ ★

The existing non-reinforced portland cement concrete pavement, constructed in 1935 with twenty foot joints, was badly cracked and required extensive patching. Prior to resurfacting, the original slabs were subsealed,

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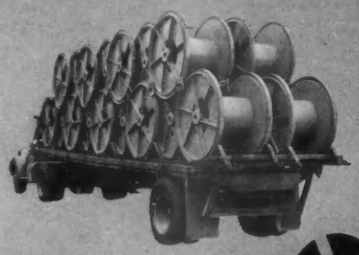
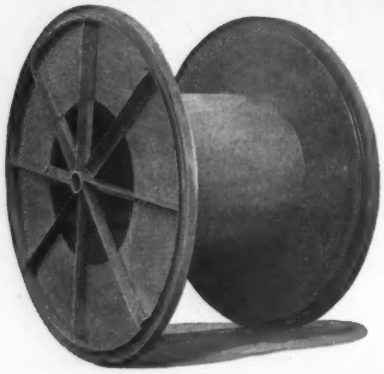


NYECO Steel Shipping Reels



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and a tack coat applied to the surface.

★ ★ ★

The metal reinforcement was placed directly over the tack coat. This was then covered with two one and a half inch courses of California Type A, a dense graded hot mix with stones of one-half inch maximum, topped by a one inch course of open graded mix also with one half inch maximum stones, purposely coarse to provide a non-skid surface.

★ ★ ★

Two sections, each 600 feet long, were reinforced with welded wire fabric. One length used fabric style 6x6-10/10, that is, the spacings were 6 by 6 inches, of number ten gauge wire, and weight, 21 pounds a hundred square feet. The other section was reinforced with 3x6-10/10 fabric which is the style that has been employed generally throughout the country on other test installations. Style 3x6-10/10 weighs 30 pounds a hundred square feet.

★ ★ ★

The sheets of fabric, 11½ feet wide and 8 feet long, were laid out on the pavement across the full lane width and were overlapped and fastened on the longitudinal wires with hog rings. In the case of the 3 by 6 inch fabric, the three inch spaced wires were placed perpendicular to the center line of the highway, previous tests in other states having indicated this position to be more effective in controlling crack formation and in preventing "rippling." The fabric was laid continuously over the two 600 foot sections.

★ ★ ★

The actual "in-service" performance of these test sections will be closely studied during the coming years. The results, coupled with the results of earlier installations of steel reinforcement (mostly welded wire fabric), probably will be cited to prove or disprove the economic justification for reinforcement in terms of reduced maintenance and longer service life.

Standards on Metallic Electrical Conductors

Since its organization in 1909, ASTM Committee B-1, which includes in its personnel leading technical authorities concerned both with the use and manufacture of electrical conductors, has endeavored to make available acceptable testing procedures and sampling methods and specifications covering the quality and other essential features of metallic conductors. Within the past few years there has been intensified activity because of the new materials and composites coming into the picture. The standards in this special compilation, represent the careful and considered technical opinions of leading men in the industry.

★ ★ ★

This 272-page compilation contains 50 standards and specifications relating to copper and copper alloy, steel, composite copper and steel, light metals, tests, and sampling procedures.

★ ★ ★

Copies can be obtained from ASTM Headquarters, 1916 Race St., Philadelphia, Pa. Price: $3.25; to members, $2.50.

References on Fatigue

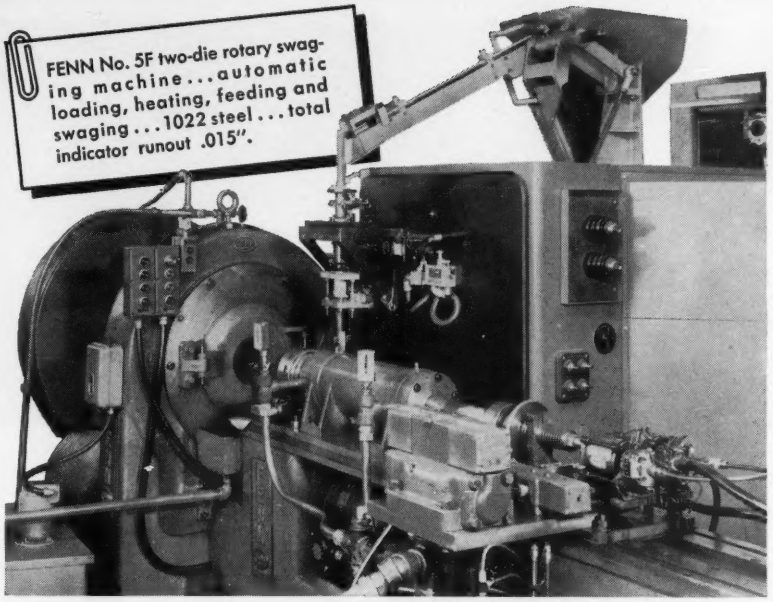
ASTM Committee E-9 on Fatigue (a group of leading experts on fatigue testing and the significance of fatigue properties) through the work of a Survey Subcommittee has prepared a list of references (about 250) to articles published in 1953 dealing with fatigue. Brief abstracts of the articles have been included when these were readily available. The list is not exhaustive but is sufficiently extensive to be of interest to those concerned with the fatigue field.

★ ★ ★

References are so arranged that sheets can be readily cut apart for filing according to any desired plan. This is the fourth list of fatigue references in as many years.

★ ★ ★

Copies of the current list of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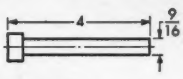
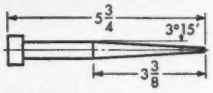
Change 

to 

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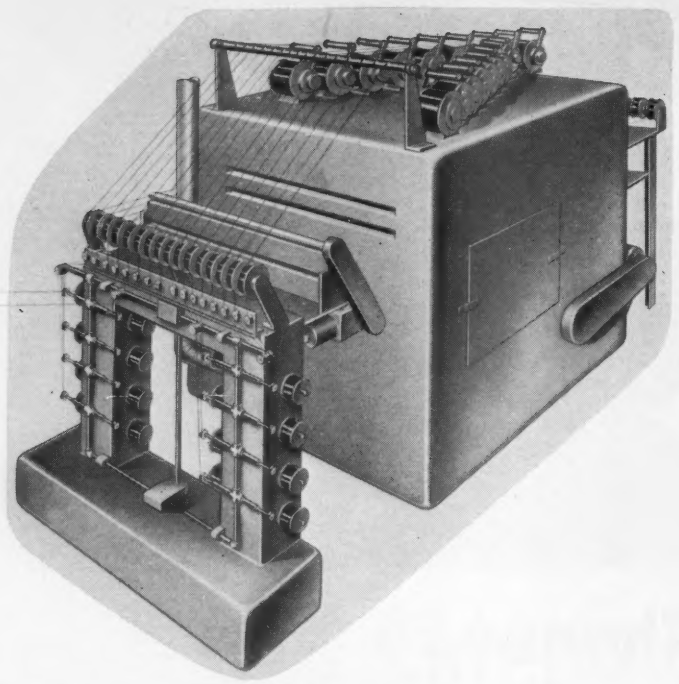

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References on Fatigue can be procured from ASTM Headquarters, 1916 Race Street, Philadelphia 3, Pa., at $1.85 each. The 1952 references are also available at $1.85. The 1950 references and the 1951 references are available at $1.50 each.

Home Work Legal in Illinois

by Francis George
Attorney At Law
Worcester, Massachusetts

The Illinois Supreme Court has declared unconstitutional a law prohibiting home work in the wire spring industry. A group of employees of the Lewis Spring Company* joined with the company in bringing the action to upset the law.

★ ★ ★

The practice of the company is to allow employees to take to their houses work in bending, guaging, assembling, looping and trimming small springs and coils. They have about 110 employees who do piece work at home on this basis and in the past eight years there have been no accidents in the operation and the payroll is well over $100,000. Most of the work can be done with the employee's own hand tools, but the company has 25 or 30 foot presses used in looping and trimming that are lent to employees to use at home.

★ ★ ★

At the trial they brought a foot press into the court room to show the judge how it worked, and when he wondered if it might be possible for a child to be hurt by one the company's attorney was able to demonstrate that it would be almost impossible, and suggested that if the government could show that it was possible they would be willing to install guards. The only basis for the law was that it was dangerous to allow work at home and the government's case collapsed when this evidence was used.

★ ★ ★

The court said that the general rule is that the government has

* Figura v Cummins 122 NE 2nd 162.

no right to interfere with the right of an individual to work wherever he chooses. Only when health, morals, safety or public welfare are involved can the government intervene. With the excellent safety record, and a fair wage schedule there was no ground at all for such a law here.

ABSTRACTS

COMPACT UNIT PLATES HEAVY DUCTILE COATINGS ON STEEL WIRE

H. Kenmore (Kenmore Metals Corp). Iron Age 1954 Vol 174 (20) pp 117-119 (Nov 11)

Copper coating on stainless steel wire reduces drawing problems: prevents formation of chrome oxides and provides good lubrication. High-speed drawing, improved product and less die wear result. Copper removed after drawing to leave stainless finish. 5 illustr.

Y* C 11.0

★ ★ ★

SOME OBSERVATIONS ON CONDITIONS OF LUBRICATION IN WIRE-DRAWING DIES

D. G. Christopherson, H. Naylor, J. Wells. Inst Petroleum Journ 1954 Vol 40 (370) pp 295-298 (Oct)

Forced lubrication of die, drawing force observations electrical resistance observations, and observations of wire distortion described. Different experimental methods all suggest that fluid lubrication can be established in die and, if established, will give more consistent and controllable behaviour. Wear in steel dies confirms view, but not yet possible to observe wear in tungsten carbide die and this cannot be assumed to have same mechanism. Rapid and simple means of detecting and measuring incipient wear is most urgent problem. 8 illustr, 6 ref.

Y* C 11.0

★ ★ ★

STUDY OF LUBRICATION IN WIRE DRAWING BY AN ELECTRICAL METHOD

A. E. Ranger, J. G. Wistreich. Inst Petroleum Journ 1954 Vol 40 (370) pp 308-314 (Oct)

Findings point to conclusion that lubrication regime in wire drawing is intermediate between boundary and hydrodynamic. Inferred that coeff of friction reflects friction within lubricant rather than work of breaking micro-welds between wire which determines rate of die wear. For this reason, coeff of friction not a suitable index of lubricant quality. Neither is electrical resistance, owing to dependence of resistivity on film thickness. 13 illustr, 8 ref.

Y* C 2.23 : C 11.0

★ ★ ★

SYMPOSIUM ON METAL-WORKING OILS. II. METAL-FORMING

Anon. Inst Petroleum Journ 1954 Vol 40 (370) pp 291-346 (Oct)

Papers by H. Ford, D. G. Christopherson, H. Naylor and J. Wells, and A. E. Ranger and J. G. Wistreich (see above) and others, with spoken and written discussion and authors' replies. 4 illustr,

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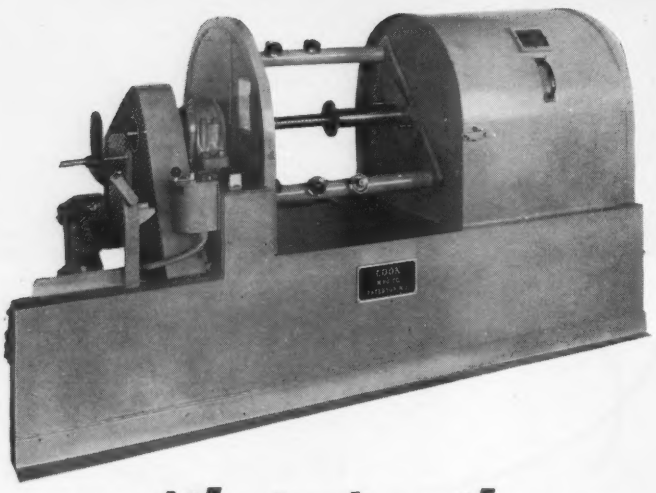

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10 ref, 1 table (in discussion).

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★ ★ ★

EINHEITLICHE GRUNDLAGEN ZUR ANSWERTUNG VON FORSCHUNGSERGEBNISSEN IN DER SPANLOSEN FORMUNG. STANDARDIZATION OF THE PRINCIPLES FOR EVALUATING RESEARCH RESULTS IN CHIPLESS PRODUCTION

H. J. Kuehne. Technik 1954 Vol 9 (4) pp 225-231 (Apr) (In German)

Attempt to provide uniform definitions for chipless production processes including wire drawing. 19 ref on wire drawing, 21 illustr.

G C 11.0

★ ★ ★

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C.F.&I. to Modernize Buffalo Plant

The Colorado Fuel & Iron Corporation has appropriated several million dollars for a modernization of its **Wickwire Spencer** steel plant on River Road scheduled to get under way this Spring.

★ ★ ★

This was disclosed by Colorado Fuel & Iron's president **Alwin F. Franz.** He declined to discuss details of the modernization because "the complete program is not yet finalized."

★ ★ ★

He has previously said that the company was considering a $2,500,000 improvement of Wickwire Spencer's rod mill. He inferred that the company's plans now encompass a more extensive plant modernization here.

★ ★ ★

"We are going to do everything we can to modernize as fast as we can," Mr. Franz declared.

★ ★ ★

He said some of the equipment for the modernization has been ordered and delivery started in March. Construction work is scheduled to begin in May.

★ ★ ★

Mr. Franz said he is optimistic about the business outlook and thinks the excess production capacity in the steel industry will "gradually dissipate itself."

Outstanding Personalities of the Wire Industry

Manager of Wire and Cable Department for National Electric Products

David A. Hinton has been named Manager of Wire and Cable Department for **National Electric Products Corporation** according to an announcement just made by **Robert C. Bennett, Jr.,** Vice President in charge of sales for the Pittsburgh, Pa. firm.

★ ★ ★

In his new position, Mr. Hinton will be responsible for the coordination of all wire and cable sales efforts with sales personnel and the company's design and production departments. He will also be charged with sales planning for new products introduced in National Electric's wire and cable lines.

★ ★ ★

Prior to joining National Electric in 1936, Mr. Hinton had worked for Bell Telephone Company and General Motors. His first position at National Electric was that of electrical engineer in the company's quotation department. During World War II he devoted much of his time to work for the armed forces on U. S. Navy shipboard cable and field wire for ground troops. In 1946, after a period of field sales work in the Pittsburgh district, he took over the job of making all of the firm's contacts with Underwriters' Laboratories.

★ ★ ★

Mr. Hinton is a 1931 graduate of the University of Pittsburgh where he earned a BS degree in electrical engineering.

Hall Retired from Kennicott

Word has been received that **Edward P. Hall,** metallurgist for the **Kennicott Wire and Cable Co.,** Phillipsdale, R. I., retired from active work on February 1, 1955.

★ ★ ★

Mr. Hall has been an active member of the Wire Association for many years and a faithful attendant at its Annual Convention and Regional Meetings. He plans to continue his membership in The Association and will reside at 164 Wilson Ave., Rumford 16, R. I.

★ ★ ★

Born in Quebec, Canada, Mr. Hall attended McGill University in Montreal, from which institution he graduated in 1912 with a degree of Bachelor of Science in Metallurgical engineering.

★ ★ ★

Prior to coming to Phillipsdale in 1918, he worked for the Dominion Bridge Company in Lachine. He joined the American Electrical Works, predecessor of Kennicott, in 1918 as Metallurgist and Wire Engineer. For several years he

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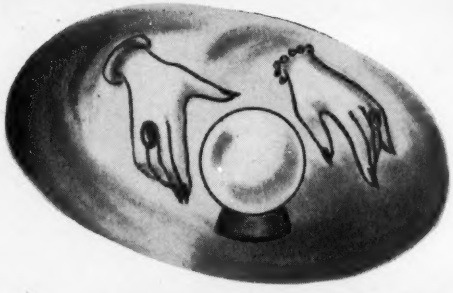

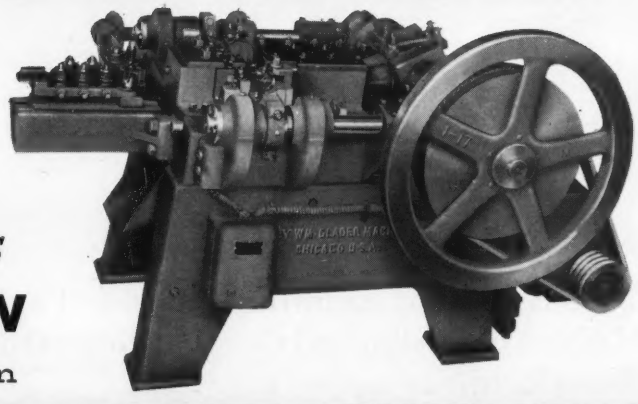

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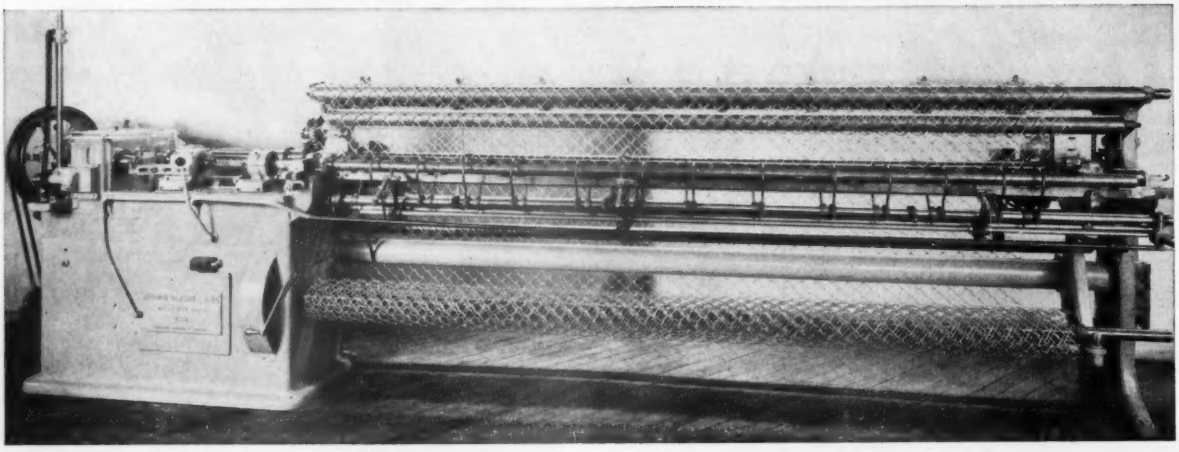

Does a fast and Beautiful Job and "Pays for itself" with the wire saved. Modern in Design and Construction. Opens a New Period in Chain-Link Manufacture.

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has served as the company's representative on the ASTM B-1, the ASA C-12 and NEMA'S Magnet Wire Section Technical Committees. He is also a member of the ASTM and the ASA.

★ ★ ★

In 1953 he was awarded a Certificate of Honorable Mention for the best non-ferrous paper in 1952 for the paper; "Development of New Asbestos Insulated Magnet Wire", which was presented at the Annual Convention in Cleveland.

Plant Manager for National Electric Products

Albert N. Semmelroth has been appointed manager of the Torrance, California plant of **National Electric Products Corp.**, Pittsburgh, Pa. He succeeds **A. D. Freshman,** recently retired.

★ ★ ★

In making this announcement **W. C. Robinson,** President, said Mr. Semmelroth assumed his duties at Torrance on Feb. 1, 1955. He had been Chief Engineer of the company's Busway division at the Elizabeth, N. J., plant.

★ ★ ★

A graduate of Cooper-Union College, Mr. Semmelroth received his Master of Science degree from Stevens Institute of Technology in 1952. During World War II he served as a radar observer and navigator for three years with the rank of First Lieutenant in the U. S. Army Air Force.

★ ★ ★

He first joined National Electric in March, 1953, and was assigned to set up new manufacturing and assembling procedures following transfer of the firm's Busway division to Elizabeth from the parent plant at Ambridge, Pa.

★ ★ ★

In his position as plant manager, Mr. Semmelroth will be responsible for the company's production of electrical conduits and supervision of warehousing facilities of National Electric's general line of electrical distribution systems located at this plant.

Promoted to Executive Vice President

Promotion of **Edwin Vereeke** to the position of Executive Vice President of **Heil Process Equipment Corporation** has been announced by that company. He previously had been Vice President in charge of Sales for Heil, a Cleveland manufacturer of chemical-resistant tanks and linings, acid heaters, lead anodes, plastic ventilating systems and related products.

★ ★ ★

Mr. Vereeke has been with **Heil** since 1946. Prior to that time, **he** spent three years as an officer **in** the United States Navy. He **is a** graduate of Ohio Wesleyan University, and a member of the National Association of Corrosion Engineers.

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WIRE AND WIRE PRODUCTS
It pays—send for rates
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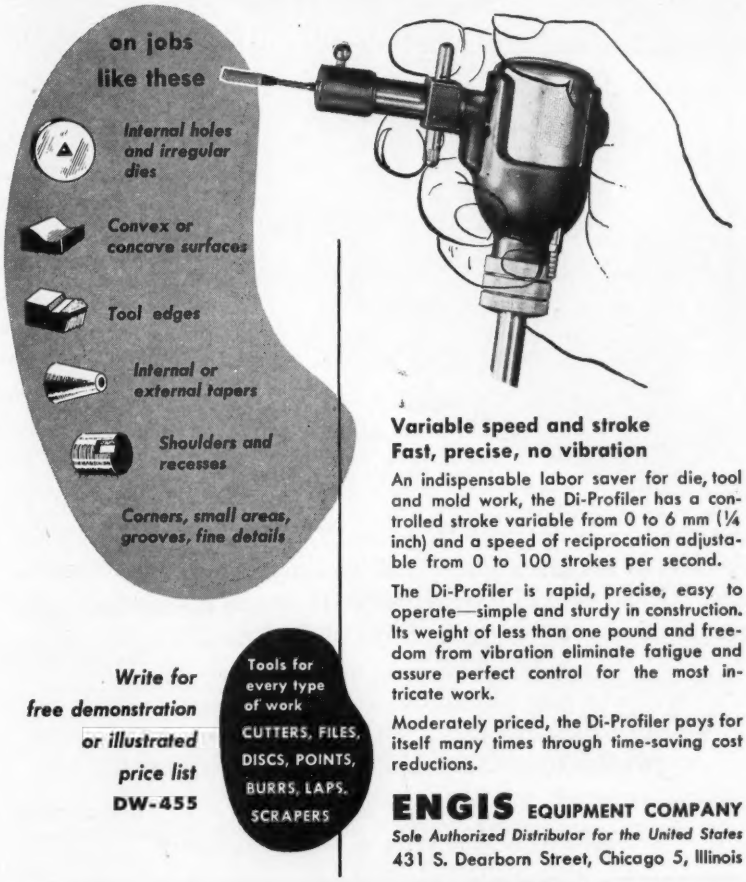
THE **Di-Profiler**

RECIPROCATING HAND MACHINE

for time-saving cutting—roughing—finishing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Heads Portsmouth Division For Detroit Steel

Detroit Steel Corporation appointed **A. E. Reinhard** general superintendent of its Portsmouth division, it has been announced.

★ ★ ★

Mr. Reinhard was with **Great Lakes Steel Corporation** since 1943. When he resigned recently, he was assistant general superintendent in charge of primary steel production.

★ ★ ★

From 1919 to 1943 he was with **Youngstown Sheet & Tube Company.** He started as a laborer in the open hearth and blooming mill departments. When he left in 1943, he was superintendent of the open hearth and Bessemer departments.

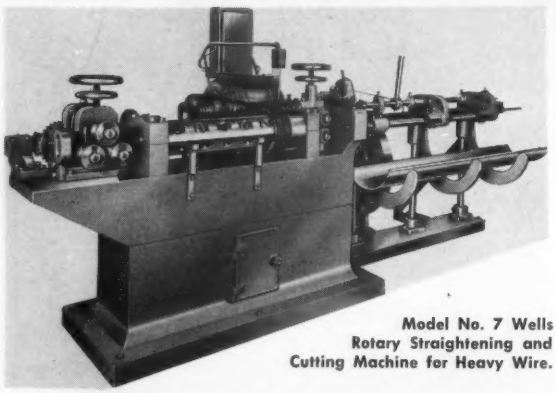
★ ★ ★

Mr. Reinhard is an alumnus of Rose Polytechnic Institute, Terre Haute, Ind. He graduated from that school in 1919 as a mechanical engineer.

A Fast, Dependable Wells

STRAIGHTENER AND CUTTER FOR HEAVY WIRE

Shown below is the famous Model No. 7 WELLS ROTARY STRAIGHTENING AND CUTTING MACHINE designed for a maximum of durability and service.



Model No. 7 Wells Rotary Straightening and Cutting Machine for Heavy Wire.

Flyer runs in ball bearings. All wear parts made of tough steel for long, trouble-free operation.

Motor and gears are readily accessible through door in base.

A highly satisfactory machine for day-in, day-out production.

This machine is designed to handle 1/4", 5/16", 3/8", 7/16" and 1/2" wire at speeds of 90' to 100' on long continuous production runs. Other WELLS MACHINES are made to handle smaller gauges of wire at correspondingly higher speeds.

Backed by 59 years of experience and development

Send for Catalog covering the full line.

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Builders of Fine Wire Working Machinery

Organization Changes at Celanese

Several organizational changes in the market development and sales departments of the Plastic Division of **Celanese Corporation of America** have been announced.

★ ★ ★

Dr. W. P. Moeller has been named Manager, Market Development Department, replacing **Dr. W. E. Holland,** resigned. Dr. Moeller, who has been with the Company since 1938, was Assistant Manager of the department. **J. W. Flynn,** previously Director of Sales, Sheet and Molding Compounds, moves into the post of Assistant Manager of the Market Development Department.

★ ★ ★

W. G. West, who has been associated with Curtiss-Wright Corporation and Spencer-Kellogg & Sons, Inc., and **H. S. Malby,** formerly with Crane Engineering Corporation and **Horace Blackham** Company, have joined the Market Development Department.

★ ★ ★

R. M. Leiter, formerly Assistant Director of Sales of the Sheet and Molding Compounds Department, has been elevated to the position vacated by Mr. Flynn.

★ ★ ★

D. R. Mahan has joined the Sales Department with headquarters in the New England District office at Leominster, Mass. He has been assigned a sales territory in central and western Massachusetts. Mr. Mahan formerly was with Atlantic Plastics, Diemolding Corporation, Tech-Art Plastics and F. J. Kirk Company.

Firth Sterling's Judkins Awarded Society Lifetime Membership

Malcolm F. Judkins, Manager of New Products for **Firth Sterling Inc.,** was presented with a lifetime membership in the **Society of Carbide Engineers** at a combined meeting of the New Jersey chapters of the American Society of Tool Engineers and the Society of

Carbide Engineers in Newark, New Jersey.

★ ★ ★

In addressing the meeting, Mr. Judkins gave a diversified talk on the manufacture, use and machining of Firth Sterling new products for use in the high temperature and corrosion fields, New products discussed were high temperature alloys, titanium carbide cermets and chromium carbides (used as jet engine alloys); nuclear reactor materials; high strength - low weight alloys (cermets and zirconium); and newer, improved carbide cutting grades (tungsten-free and TXL for steel milling).

★ ★ ★

A graduate of the University of Washington and Carnegie Institute of Technology where he received his master's degree in chemical engineering, Mr. Judkins joined Firth Sterling as an engineer in 1929. During World War II he served as a consultant to the Office Chief of Ordnance on problems of carbide shell tooling in the ammunition branch. He has been Manager of New Products since 1953.

Assigned to Pennsalt's Gilron Unit

John Mordica and **Gene C. Edwards,** veteran members of the **Gilron Products Company** sales staff, will continue to service their respective accounts following consolidation of their organization with the **Pennsylvania Salt Manufacturing Company.**

★ ★ ★

As previously announced, the assets of Gilron Products have been acquired by Pennsalt Chemicals and its organization is being integrated with the parent company's Metal Processing Department. Distribution of Gilron Products which feature Drawcote, a dry, soak-type drawing compound, and a line of metal cleaners, will continue on an expanded scale.

★ ★ ★

Mr. Mordica joined the Gilron organization in 1945 after nine years service on the sales staff of Firth-Sterling. Prior to that assignment he was associated with the Wire Division of Bethlehem Steel. He received his technical education at the University of Maryland.

★ ★ ★

Also a veteran in the metal processing field, Mr. Edwards served successively as plating supervisor for the Standard Steel Spring Company, and superintendent of the plating department of the Chrysler Corporation.

Heads Acheson Chicago Sales Territory

Norman T. Bauer has just been appointed service engineer, with offices at 333 North Michigan Avenue, for the Chicago sales territory of **Acheson Colloids Company,** Port Huron, Mich. Acheson Colloids manufactures dispersions of 'dag' Colloidal Graphite, molybdenum disulfide, and other solid materials, in such carriers as oils, volatile hydrocarbons, and resins.

A member of the American Society of Lubrication Engineers,

THIS ONE WAS EASY . . .
A Nilson 4-Slide, Number 1, forms 150 drapery hooks per minute from 0.70 basic steel wire. Nilson 4-Slides form wire or ribbon stock from the coil. They straighten, feed, pierce, blank, swage, stamp or coin, cut and form in one, fast, automatic operation . . . accommodate wire up to .5" dia., in feeds to 32" max., and ribbon up to 3.5" wide. Press sections from 5 to 75 tons. Send for catalog.

NILSON 4-SLIDE TAKES A TOUGH ONE

Mass production of body trim clips for a leading make automobile proved a complex forming problem. A. H. Nilson's 4-Slide (Model S-4-T) did the job, forming .025" x 3", 1065 C.R.A. steel at 54 strokes per minute! Accurate, fast, and automatic, Nilson 4-Slides keep pace with one of the nation's biggest industries.

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Automatic Chain Making Machines : Staple Forming Machines : Wire and Stock Reels : Wire Straightening Equipment : Slide Feeds for Presses

Mr. Bauer attended the Illinois Institute of Technology and Northwestern University. He was formerly associated with Miner Laboratories and Kocour Company, both of Chicago.

Vascoloy-Ramet Organization Changes

Herbert B. Clark, who has been president and general manager of **Vascoloy-Ramet Corporation,** has been appointed executive vice president of **Fansteel Metallurgical Corporation** and its subsidiaries, **Vascoloy-Ramet Corporation, WW Alloys, Inc.** and **Tantalum Defense Corporation.**

★ ★ ★

One of the early pioneers in the development and application of carbide tools and dies, Mr. Clark has been associated with Fansteel and Vascoloy-Ramet since 1939. He has been a Fansteel director since 1951.

★ ★ ★

George T. Brennan, previously works manager of Vascoloy-Ramet, has been appointed general manager.

WHICH WIRE STRAIGHTENING AND CUTTING MACHINE DO YOU NEED?

Chart at right lists **16 Lewis Wire Straightening and Cutting Machines** for wire from .012" and stock to 3/4" in round, square, hexagonal or other shapes. Machines handle every type of material. Your choice of stationary cut-off or high-speed flying shear type cut-off. Wide range of feed speeds. Cut **your** wire straightening and cutting costs with **Lewis** wire machines.

✓		WIRE or ROD SIZE	MODEL NUMBER STATIONARY CUT-OFF	MODEL NUMBER FLYING SHEAR
	ROUND	Up to 1/8"	"7"	....
	ROUND	.012" to .080"	"0"	....
	ROUND	1/16" to 1/8"	1-C	....
	ROUND	1/16" to 3/16"	2-C3	....
	ROUND	5/64" to 3/16"	.....	3-F
	ROUND	3/32" to 1/4"	2-CSC	....
	ROUND	3/32" to 1/4"	2-C4	....
	ROUND	3/32" to 1/4"	4-C	4-F
	ROUND	5/32" to 3/8"	8-C	8-F
	ROUND	1/4" to 1/2"	9-C	9-F
	ROUND	3/8" to 5/8"	10-C	10-F
	ROUND	1/2" to 3/4"	.....	11-F
	SQUARE or Equiv.	1/16" to 3/16"	14-C	....
	SQUARE or Equiv.	3/16" to 1/2"	.....	19-F
	SQUARE or Equiv.	5/16" to 5/8"	.....	20-F

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Chase Brass Elects Officer

The election of **Glenn P. Bakken,** of Phoenix, Arizona, as a director and executive vice president of **Chase Brass & Copper Co., Inc.,** a subsidiary of **Kennecott Copper Corporation,** was announced by **Richard C. Diehl,** president of Chase, following a meeting of the company's board of directors in January. Mr. Bakken succeeds **Wallace C. Husted,** who retired September 1, 1954.

★ ★ ★

He is a native of Minneapolis, Minnesota, and was graduated from the University of Minnesota in 1942 with the degree of B. S. in Mechanical Engineering. Upon graduation, he accepted a position with the **Aluminum Company of America,** in Lafayette, Indiana, attaining a supervisory position in the industrial engineering and production control divisions.

★ ★ ★

In 1946 Mr. Bakken joined the **Reynolds Metals Company,** in Grand Rapids, Michigan, where he served as extrusion superintendent. In 1947 he was transferred to the Reynolds' plant in Phoenix, Arizona, as plant superintendent and in 1950 was elevated to the position of plant manager.

Scovill Announces Main Plant Organizational Changes

Arthur P. Hickcox, vice president and general manager of main plant operations of **Scovill Manufacturing Co.,** Waterbury, Conn., has announced organizational changes in the main plant operations.

★ ★ ★

Arthur M. Rogers, formerly assistant to the vice president in charge of manufacturing sales, and **George A. Goss, Jr.,** formerly budget director of the manufacturing department, become assistants to Mr. Hickcox. **Ernest F. Rumberg,** assistant planning director, has been named director of planning. He succeeds John B. Goss who recently resigned because of ill health.

★ ★ ★

Besides these new appointees

the following main plant executives will report to Mr. Hickcox:

★ ★ ★

Paul E. Fenton, vice president in charge of sales, and **Henry W. Wild,** vice president in charge of production and tools in the manufacturing division, and **Chauncey P. Goss,** vice president in charge of sales, and **Jon J. Hoben,** works manager, in the mills division.

★ ★ ★

Also, Mark L. Sperry, vice president in charge of engineering and maintenance; **Alan C. Curtiss,** vice president and director of employee relations; **Ivan L. Coulter,** comptroller (for main plant accounting), and **Lewis F. Cobb,** director of purchases.

Executive Appointments by Naugatuck Chemical

Dr. Wesley S. Coe has been appointed assistant to **John E. Caskey,** vice president and general manager of the **Naugatuck Chemical Division, United States Rubber Co.**

★ ★ ★

Dr. Coe was previously assistant factory manager of the chemical and synthetic rubber plants operated by the division in Naugatuck. In his new post he will handle special assignments for the general manager and assistant general manager, and also be secretary to the division staff.

★ ★ ★

It was also announced that **Dr. J. Nelson Judy** has been named assistant to the factory manager at Naugatuck. Dr. Judy, who joined U. S. Rubber in 1940, was formerly manager of process development for the Naugatuck Chemical Division.

Carboloy Promotes Engineer

R. J. Studders, magnet development engineer, **Carboloy Department** of **General Electric Company,** has been appointed manager of magnetic products engineering. He replaces **E. E. George,** recently appointed plant manager of Carboloy Department's Edmore, Mich., permanent magnet plant.

★ ★ ★

Mr. Studders joined Carboloy Department in 1950 when permanent magnet operations were centered in Schenectady, N.Y. His first association as a magnet engineer with the General Electric Company was in 1944, when he left the Vanadium Corporation's chemical and metallurgical laboratory.

★ ★ ★

He holds a B.S. degree in chemistry from Niagara University's school of engineering. He is a member of the American Chemical Society.

Durall Products Company Formed

Louis D. Root, Jr., president of the **New York Wire Cloth Company,** of York, Pa., has announced the formation of the **Durall Products Company** as a division of the 67 year old parent company.

★ ★ ★

The new company, with plant and offices in York, will manufacture and sell the Durall frameless tension screen for window installation, and such other products as may be added to the line from time to time. Several new products

PLYMOUTH SERVES

For 131 years Plymouth has been making quality products —each engineered for the specific job.

THE WIRE INDUSTRY

is now able to benefit from this experience. Plymouth's top-flight engineers welcome inquiries on any cable filler problems.

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you get the exact put up that works best on your equipment with any type treatment—wax, jute saturant, anthracene.

IMPROVED CABLE FILLER

This new filler is made to fine tolerance, always uniform and twisted to your exact specifications. Write for samples.

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Warwick, Virginia

PLYMOUTH TRADE MARK 1824

are being studied at this time, and announcement is expected shortly of one or more additions.

★ ★ ★

The Durall Products Company has been set up as a separate organization to create a logical base for expansion into products that may require different methods and channels of distribution from those of New York Wire Cloth.

★ ★ ★

Howard A. Nusbaum, formerly sales manager for Durall screens, has been appointed General Manager of the Durall Products Company, and **John Ahlstrom,** formerly head of market research for the parent company, will be Sales Manager.

★ ★ ★

The Durall Products Company will be represented in the field by the New York Wire Cloth sales organization, under the direction of **Stuart Jones,** vice president in charge of sales.

International Nickel Appointments

The appointments of **Albert P. Gagnebin** as Assistant Manager of the Nickel Sales Department and of **Edward B. Bitzer** as Assistant Manager of the Nickel Alloys Department of **The International Nickel Company, Inc.,** were announced today by **Lars R. Larson,** Vice President and General Sales Manager of the company.

★ ★ ★

At the same time the company announced that **Keith D. Millis** has been placed in charge of the Ductile Iron Section of the Development and Research Division, succeeding Mr. Gagnebin.

★ ★ ★

Hall Opens Consulting Office

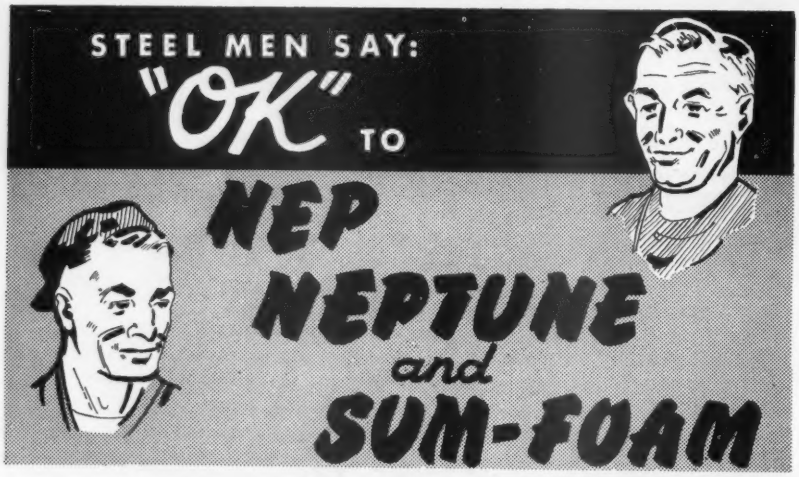
Edward P. Hall, having retired from the **Kennicott Wire and Cable Company** after 36 years of service as Chief Metallurgist and Wire Engineer, has announced that he has opened an office to render services as a Consulting Wire Engineer and Non-Ferrous Metallurgist. Mr. Hall retired on February 1, 1955, and will have offices at 164 Wilson Ave., Rumford 16, R. I. His telephone is East Providence 1-2086R. Mr. Hall's retirement was announced in the February issue of Wire and Wire Products, from which it may be seen that his long successful record fits him admirably to serve in his new capacity.

Appoints Research Director

The Catalytic Combustion Corporation has announced that **Harold R. Suter** has joined its staff as of February 1, and will maintain offices in the Corporation's Headquarters — 4544 Grand River, Detroit. In his new position as Vice-President in Charge of Research and Development, Mr. Suter will be responsible for new and special product applications, and will be available for customer consultation in the many new fields of Air Pollution Control being served by Catalytic Combustion Systems.

★ ★ ★

The Suter-Ruff patented catalysts, developed jointly some years ago by Mr. Suter and Mr. R. J. Ruff, the Corporation's President, is the "heart" of the CCC Systems, and extensive installations can be



INHIBITORS, ACCELERATORS and FOAMING COMPOUNDS for EFFICIENT PICKLING

Steel men are particular people. They do not approve easily. BUT — when it comes to Parkin products for pickling steel, the answer is invariably an unqualified OK!

HERE'S WHY { PARKIN ACID INHIBITORS, ACID ACCELERATORS and FOAMERS *are the most efficient available:* EACH THE RESULT OF YEARS OF SPECIALIZED EFFORT TO MAKE THEM SO.

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PICKLING SPECIALISTS
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IN STEEL SINCE 1860

found in chemical manufacturing, paint, wire enameling, metal decorating, foundry, and sheet metal processing industries. Heat recovery or odor elimination from exhaust gases and acceleration of certain chemical processes are typical functions for which Suter-Ruff Catalysts are used.

★ ★ ★

Until the late 1930's the company was known as a manufacturer of metal cans, but has since added a large line of fibre drums, paper containers, paper bags and other items. The Fibre Drum Division recently entered the wire industry with a new container called the "Payoffpak", now being increasingly employed in the packing, dispensing, storing and shipping of wire. It also makes fibre containers for nails and other fasteners.

Made Manager of GE's Alkyd Products Plant

The appointment of **Dr. John A. Loritsch** as Manager of the G-E Chemical Materials Department's Alkyd Products Plant was announced by **S. L. Brous,** Department general manager.

★ ★ ★

A native of Wheeling, W. Va., Dr. Loritsch earned his B.S. ChE., B.S., and PhD. degrees at the University of Notre Dame. After service as a chemist with Rohm & Haas, he joined the **General Electric Company's** Research Laboratory in 1940, in the capacity of research chemist.

★ ★ ★

He became a Group Leader in the Chemical Division's Resin and Insulating Materials Dept. in 1945. Three years later he was named section engineer in charge of insulating materials in the Division.

★ ★ ★

In 1950, Dr. Loritsch became section engineer, responsible for product development engineering, and in 1951 he was appointed Manager—Alkyds Engineering, the position preceding his present appointment.

★ ★ ★

One of three plants operated by the General Electric Company's Chemical Materials Department, the Alkyd Products operation is located at #1 River Road, Schenectady, N. Y.

Issues Price List of Mill Products

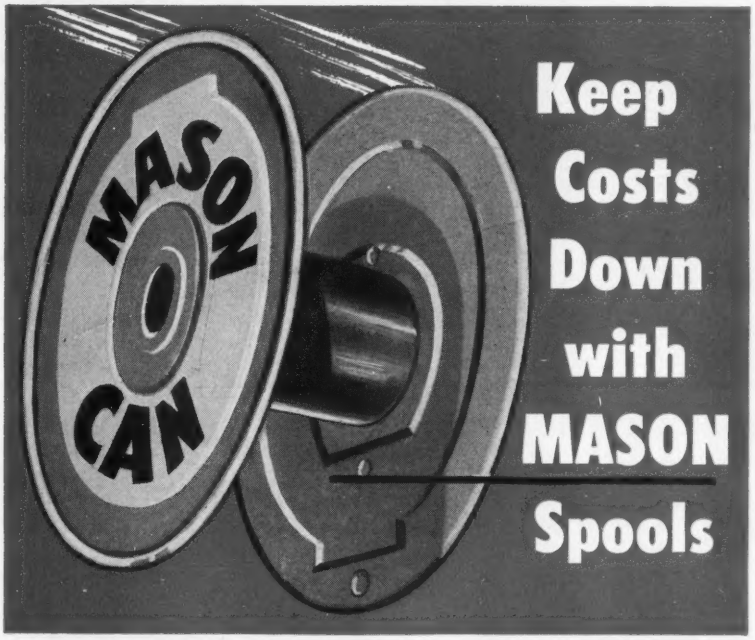
Scovill Manufacturing Co., Waterbury 20, Conn., has issued Bulletin No. 1-39 listing base prices effective February 2, 1955 on brass, copper, bronzes, nickel silver alloys and extruded shapes. With this is included, if desired, Bulletin No. 4-36 covering brass mill scrap. Please send for these price lists if interested.

Made Assistant to Vice President

William J. Ryan has been appointed Assistant to **Herbert T. Florence,** Executive Vice-President and General Manager of **The Cleveland Crane & Engineering Co.,** Wickliffe, Ohio.

★ ★ ★

Mr. Ryan formerly held the positions of Personnel Manager and Office Manager. He has been with the company since July, 1949.



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And they help you sell, too! Mason lithography (to meet your specifications) will always assure color uniformity and sharpness of detail for *instant brand identification.*

MASON lightweight, non-returnable spools are available in 5", 6½", 8½", and 10½" head sizes. All sizes are available with 1⅛" (Dia.) barrel. The 10½" head size is also available with a 3½" (Dia.) barrel. Barrel lengths from ⅝" to 14".

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1949 Dexter Road, E. Providence 14, R. I.
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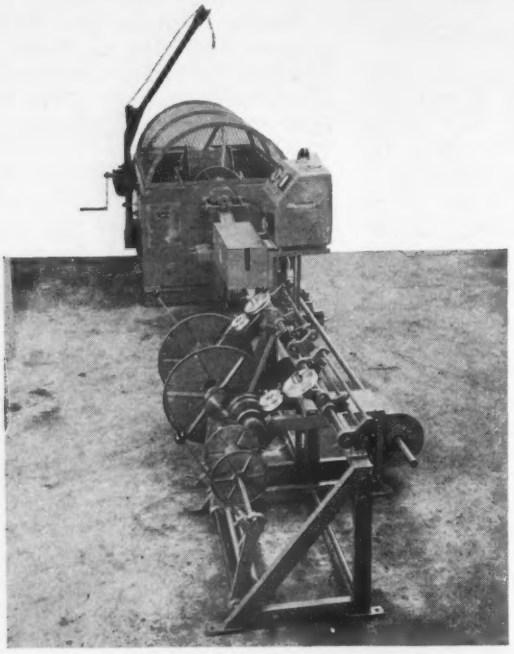

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HORIZONTAL TWINNER

- **HIGHLY PRODUCTIVE**
  - —800 lays a minute
  - —Large drums:

  Pay-off: 16 & 24" flange diameter
  Take-up: up to 42"
  - —double take-up assembly.
- **SURE**
  - —tension easy to balance
  - —equipped with a sparker device
  - —stopping for a predeterminate length.
- **EASY TO USE**
  - —Lays from 2" to 6"
- **ESPECIALLY EFFICIENT FOR MILITARY TRANSMISSION CABLE.**

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SEE THE DIFFERENCE YOURSELF...
BETWEEN JUST ANY SPOOL AND
Superior MPS
NO-CREV SPOOLS
No-Crev Spools eliminate the conventional crevice at the inner junction of spool head and barrel. No more production slow-ups due to fine wires getting caught in such a crevice. You can now have continuous trouble-free high speed winding.
We invite your inquiries — let us tell you more about No-Crev Spools. Write us today.
MPS
NO-CREV SPOOLS
give you brute strength with dimensional precision, concentricity, and balance. Another patented MPS development engineered to help you!
Mossberg PRESSED STEEL Corporation
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MASSACHUSETTS, U. S. A.
Telephone Attleboro 1-0848
#108

American Chain & Cable Names Three New Officials

American Chain & Cable Company has named three men to new positions at its American Chain division plant at York, Pa.

★ ★ ★

Appointed as plant manager was **Earl S. Lathrop; H. L. Cummings** was named assistant plant manager, and **N. L Kohler** was made plant manager of the malleable iron foundry at York.

★ ★ ★

Mr. Lathrop joined the company in 1946 after nine years in general industrial engineering work with the **Aluminum Company of America.** He handled industrial engineering assignments at various ACCO plants from 1946 to 1948 and, for the past six years, has served as assistant to the plant manager of the electric welding operation at York.

★ ★ ★

Mr. Cumming's service with American Chain & Cable dates back to 1938 when he was employed as an industrial engineer at York and Hartford, Conn. From 1940 to 1950, he acted as an engineering consultant for the firm of Norris & Elliott and later served as a staff engineer with the George H. Elliott Company. He rejoined American Chain & Cable at York in May, 1953 as supervisor of industrial engineering.

★ ★ ★

An ACCO employee since 1916, Mr. Kohler has served as office manager of the York malleable foundry since 1937, in charge of cost and accounting. Prior to that he was a member of the accounting department and also worked in a similar capacity for the firm's electric welding operation at York.

To Handle Webb Wire's Midwest Sales

Delwyn A. Marquette has been placed in charge of sales in the Midwest by the **Webb Wire Division** of the **Carpenter Steel Company,** New Brunswick, N. J. He will represent the company in the Detroit area.

Appointed Manager of Sales by Macwhyte

Francis D. Holden was appointed Manager of Sales of Macwhyte Company, as of February 1, 1955.

★ ★ ★

The announcement was made by **R. P. Tyler,** Vice-President in Charge of Sales.

★ ★ ★

Mr. Holden had been Assistant General Sales Manager which position he held since December 1, 1948.

★ ★ ★

He was employed by Macwhyte Company during school vacations while he attended Lawrence College. After graduation, he was reemployed by Macwhyte Company in 1934 in the General Sales Department.

★ ★ ★

In October of 1943 he entered the Naval Service, became a Lieutenant and at the close of the war returned to Macwhyte Company to the General Sales and Export Divisions.

★ ★ ★

Mr. Holden has had more than

all sizes and constructions of high quality copper and bronze wire

SPENCER WIRE CORPORATION

555 LEHIGH AVENUE, UNION, N. J.

Plants at UNION, N. J. Telephone: MUrdock 6-7950

20 years experience in Macwhyte Company General Sales and Export Divisions.

STILL A FEW COPIES AVAILABLE OF THAT REMARKABLE BOOK

"STEEL WIRE IN AMERICA"

by the late K. B. Lewis

If you do not have a copy of this extraordinarily informative and easy-to-read book, send for a copy today.

The price is $15.00, but well worth it.

Send check or order to

WIRE AND WIRE PRODUCTS

453 MAIN ST. STAMFORD, CONN.

Wire Equipment Appoints Sales Manager

R. J. Seymour, Vice President of the **Wire Equipment Manufacturing Company, Inc.,** of Trenton, N. J., has announced the appointment of **K. P. Jackson** as Sales Manager.

★ ★ ★

Prior to joining the WEMCO organization, Mr. Jackson, as a manufacturer's agent serving the wire industry, handled the sales of WEMCO special machinery.

This appointment has been made in line with the companys' expansion program and as a result of the increasing demand for WEMCO products, including, in addition to special machinery, standard single and multiple take-up and payoff units, high-speed continuous coilers and spoolers, the well-known WEMCO molten metal transfer pump, bobbin winder and spiral Nail Grooving Tool.

John M. Gillard

John M. Gillard 47, Manager of Sales—Wire and Wire Products, Detroit Steel Corporation, died recently after a brief illness.

★ ★ ★

He joined the company's Craine-Schrage Steel Division in 1939, becoming Manager of the Wire Sales Department in 1944, and Assistant Division Manager, in 1948.

★ ★ ★

Shortly after the company acquired the Portsmouth Steel Corporation plant in 1950, he was transferred to the General Office and promoted to the position he held at the time of his death.

George Spence

George Spence, for 17 years general sales manager of the **Steel Company of Canada,** died January 26th at his home, 11 Forest Avenue, Hamilton, Canada.

★ ★ ★

Mr. Spence's retirement in 1943 brought to a close a long record of service in the steel industry of more than 50 years. Born and educated in Hamilton, he entered the business world in 1893 with the Canada Screw Company, later joining the Steel Company of Canada on its formation in 1910.

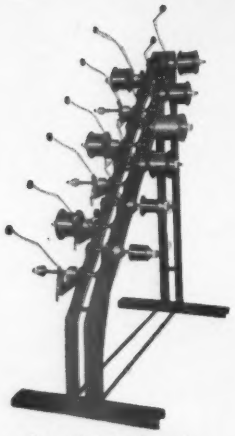
★ ★ ★

His experience in the steel industry had been a varied one, being successively stock clerk, head of invoicing costing and accounting. In 1919 he was placed in charge of sales in Hamilton, followed by his appointment in 1926 as sales manager.

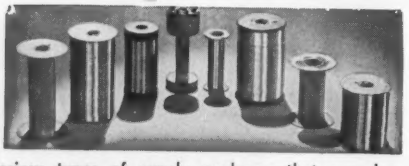
STANDARD UNI-DRIVE WIRE WINDER

INCREASE YOUR PRODUCTION WITH THIS WINDER

Wire Winder



Pay-off Attachment



Various types of supply packages that may be wound on Standard Uni-Drive Wire Winder.

PAYOFF

Our payoff attachment is made with self-aligning ball bearings and a compensating attachment to control the tension of each end. Applies same tension when spool is empty as when full.

The new Uni-Drive Winder with Payoff Attachment is new in design and incorporates several improved and tested features. Production is stepped up through increased speed. It produces smooth, even and accurately wound spools of wire in single or multiple ends. All strands parallel—no over or under-winding. Automatic Stop-Motion controls each strand. Compensating attachment produces perfectly controlled tension. Traverse adjustable from 1¾" to 5½" between spool heads without changing cam. Designed especially for winding wire to be braided and shielded for electrical conductors up to ¾" diameter.
Payoff can be equipped with Carboloy Guide Inserts at additional cost.

STANDARD MILL SUPPLY COMPANY

PAWTUCKET, RHODE ISLAND, U.S.A.

1064-1080 Main St.

PAwtucket 3-1534 — 3-1535 — 3-1536

A Review of Recent Wire Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine and remitting 50¢ for each copy desired. For orders received from outside the United States the cost will be $1.00 per copy.

No. 2,700,777, BED SPRING, patented February 1, 1955 by Rudolph Coopersmith, Clayton, Mo.

A bed spring is disclosed comprising a frame having parallel sides and ends, supporting wire members disposed in spaced relation within the frame and extending in the same direction at similar oblique angles with the sides and ends, wire coil springs distributed in spaced relation within said frame above the supporting members and secured thereto. The frame further comprises a reinforcing bar extending across the frame between the sides, and certain of the supporting members being connected to the bar.

★ ★ ★

No. 2,701,008, BACK SPRING CONSTRUCTION, patented February 1, 1955 by Alfred Henry Haberstump, Detroit, Mich., assignor, by mesne assignments, to No-Sag Spring Company, Detroit, Mich., a corporation of Michigan.

A base frame is provided, made of wire and formed into rectangular shape having at least one pair of parallelly disposed wires interconnecting the side portions thereof with U-shaped spring elements having a web portion and extending arms, the ends of the arms being hooked about the parallel wires providing a support for the spring elements on the base frame. There is also a forward frame secured to the forwardly disposed web ends of the U-shaped spring elements providing a resilient support therefor which braces the forward frame when spring strips are connected thereacross, the spring element disposed adjacent to a side frame portion having its arm portions disposed in crossed relation to brace the forward frame against lateral displacement.

★ ★ ★

No. 2,701,470, METHOD OF DETECTING STIFF SECTIONS IN FLEXIBLE FILAMENTS, patented February 8, 1955 by William L. Ames, Middle River, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

The method of detecting a stiff tubular splice in a flexible wire conductor embedded in a flexible insulating sheath is disclosed which comprises advancing such a conductor under such tension and along a predetermined arcuate path having a radius of curvature sufficiently small as to cause the splice to protrude beyond the normal arcuate path of travel of the adjacent flexible portions of the insulated conductor, and continuously monitoring the advancing conductor to detect any protusion beyond the arcuate path of travel to determin the location of the splice.

★ ★ ★

No. 2,701,471, METHOD OF AND APPARATUS FOR DETECTING STIFF SECTIONS IN FLEXIBLE FILAMENTS, patented February 8, 1955, by Wentworth D. Boynton, Baltimore, Md., assignor to Western Electric Company, Incorporated, New York, N. Y., a corporation of New York.

Here the method is of detecting stiff, permanently deformable sections in flexible wire filaments, and comprises bending all portions of the filament to an extent such that only such stiff sections therein are permanently deformed so that the stiff sections extend laterally of the normal longitudinal axis of the flexible portions of the filament when the filament is straightened, straighten-

Save Money with NORBIDE® Abrasive . . .

Are you still using costly diamond dust for refinishing your wire drawing dies? Many wire mills are saving money by using NORBIDE Abrasive for ripping or fast stock removal as well as for accurate semi-finishing operations.

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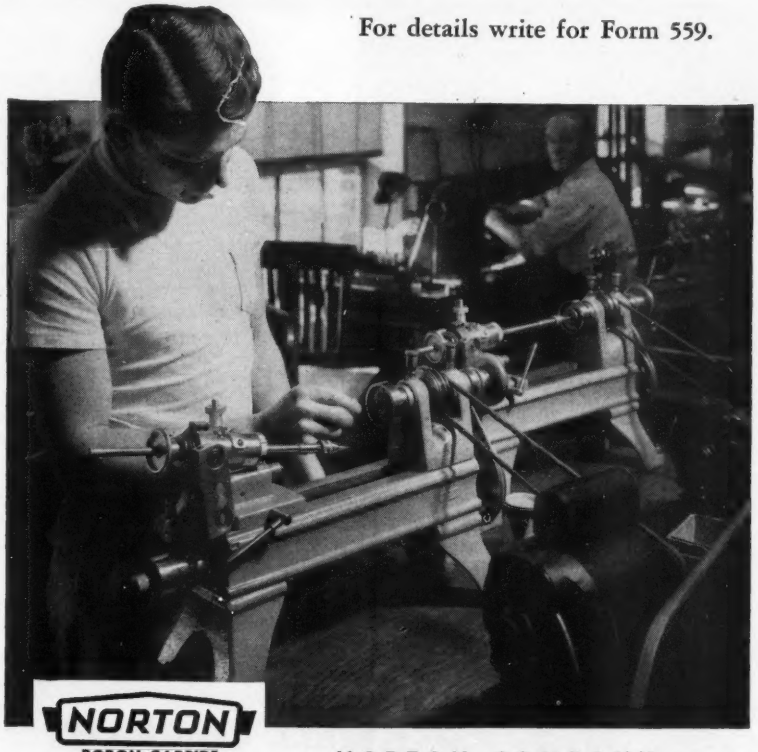


NORTON
BORON CARBIDE

NORTON COMPANY
45 New Bond Street • Worcester 6, Massachusetts

NORBIDE® . . . *the hardest man-made abrasive*

ing the flexible portions of the filament under a tension insufficient to straighten the stiff sections, and then detecting the portions extending laterally of the normal longitudinal axis of the flexible portions of the filament to locate the stiff sections.

★ ★ ★

No. 2,702,498, WIRE MAT, patented February 22, 1955, by Oscar F. Arthur, Connellsville, Pa.

A field mat panel of the reticular type is disclosed.

★ ★ ★

No. 2,702,525, APPARATUS FOR COATING WIRE OR STRIP WITH MOLTEN ALUMINUM, patented February 22, 1955, by Marshall G. Whitfield, Garden City, N. Y., assignor to Whitfield & Sheshunoff Incorporated, Garden City, N. Y., a corporation of New York.

★ ★ ★

Apparatus is provided for use in the production of an even coating of aluminum on wire or strip. There are eleven claims.

★ ★ ★

No. 2,702,650, RECEPTACLE, patented February 22, 1955, by Israel Botknecht, also known as Israel Botnik, New York, N. Y.

The receptacle is formed of circular loops of wire providing an inverted truncated cone, with wire legs at its lower end.

No. 2,702,762, VITREOUS ENAMELING PROCESS AND COMPOSITION, assignor to Poor & Company, a corporation of Delaware, patented February 22, 1955 by Allan E. Chester, Highland Park, Ill.

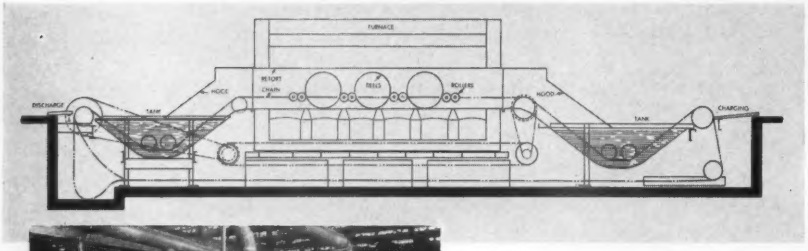
In a method of coating ferrous metals with vitreous enamels, the step is disclosed which comprises pretreating the ferrous metal with a uniform thin coating containing potassium atimonyl tartrate and a choloride of barium, strontium, manganese or magnesium.

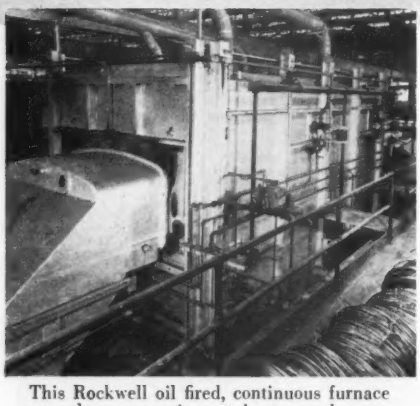
★ ★ ★

No. 2,702,768, FERROUS SURFACE COATING PROCESS USING ALKALI METAL PHOSPHATES AND HYDROXYLAMINES, patented February 22, 1955, by Montagu Hyams and Andrew Nicholson, London, England, assignors to Parker Rust-Proof Company, Detroit, Mich., a corporation of Michigan.

A liquid composition for the production of phosphate coatings on ferrous surfaces, is disclosed consisting of an aqueous solution consisting essentially of at least one substance selected from the group consisting of phosphoric acid, ammonium phosphate and the alkali metal phosphates, said phosphate being present in a concentration of from 0.05 to 0.25 molar, hydroxylamine in the amount of .1 percent to .5 percent and the salts thereof in an equivalent concentration, this solution containing sufficient alkaline material to produce a pH within the range of 4.2 to 5.8.

Bright Anneals Copper Wire at Lowest Cost





This Rockwell oil fired, continuous furnace anneals copper wire on drums at the rate of 120,000 lbs. per 24 hrs. Drums travel 4 abreast. The work is carried through the exit hood, in foreground, into a steel water tank for quenching, without exposure.

The "wet" method of annealing copper wire (to be subsequently rubber covered), is a Rockwell development that has proved very efficient in operational simplicity, production quality, and labor and space saving.

Drums of coiled wire move continuously, from the wash or other process through a wet or dry seal, then through the alloy retort of the furnace, exit hood, water quench and discharge.

The reels or drums of wire travel several abreast, being rolled along the tanks and retort floor by pipe rollers attached to the alloy link chain conveyor. Length of processing system depends on production needs.

The furnace may be gas or oil fired, or electric. Annealing atmosphere may be provided to assure desired brightness of metal.

It will pay you to learn more about this and other types of Rockwell wire heating equipment. Get Bulletin 432.

ROCKWELL ALSO BUILDS

Batch and continuous furnaces and ovens for annealing, aging, drying, enameling, tinning, glass coating, synthetic coating. Atmosphere generators.

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2425 ELIOT STREET • FAIRFIELD, CONN.

Sales Representatives in Principal Cities

Wire Cloth Firm Moves Offices to York

The New York Wire Cloth Co., who have their general offices in New Canaan, Conn., are moving them to York, Pa., to bring together their administration, production and sales offices.

★ ★ ★

The company is said to be the largest independent manufacturer of wire cloth in the country and a pioneer in window screen manufacturing. They are makers of the Durall aluminum tension screen that does away with wooden screen frames.

★ ★ ★

That they are up-to-date and on their toes is indicated by the fact that since World War II, the company has owned its own plane for the use of executives. This has been used 500 to 600 hours per year. The move to York has been accompanied by the purchase of a new Beechcraft twin-engine plane in anticipation of possibly a larger use than ever of this mode of transportation.

Cold GR-S Polymers for Wire Insulation

(*Continued from page 443*)

TABLE IX

JACKET FOR ARCTIC SERVICE

GR-S 1504	100.00
Zinc Oxide	4.50
EPC Carbon Black	35.00
HMF Carbon Black	20.00
Hard Clay	40.00
Coumarone Indene Resin	15.00
Process Oil	5.00
Pine Tar	1.50
Zinc Laurate	1.00
Protective Wax	5.00
Blend of Diarylamine—Ketone Reaction Product with N,N'diphenyl-p-phenylene Diamine	1.00
Butyraldehyde—Aniline Reaction Product	1.00
Tetramethyl Thiuram Monosulfide	0.60
Sulfur	1.85
	231.45
Specific Gravity	1.26
Mooney Scorch @ 250°F.	
Scorch Time	11′ 45″
Cure Rate	4′ 45″

Tubing Data Based on Garvey Die

89.2 Grams Per Minute
31.9 Inches Per Minute
36.0% Swell Per ¼" Thickness

Test Specimens cured in flash vulcanizer at 240 psi steam (402°F.)

UNAGED PHYSICAL PROPERTIES

Seconds @ 402°F.	200% Modulus psi	Tensile psi	Elongation %	ASTM Set Inches	Brittleness −65°	Shore Hardness "A"
10	130	140	320	1.12	OK	47
15	150	330	400	0.24	OK	47
20	450	1450	540	0.16	OK	63
25	530	1740	530	0.16	OK	60

PHYSICAL PROPERTIES AFTER AGING 96 HRS. IN OXYGEN BOMB @ 70°C. & 300 PSI

Seconds @ 402°F.	200% Modulus psi	Tensile psi	Elongation %	ASTM Set Inches	Brittleness −65°	Shore Hardness "A"
10	100	130(93%)	320(100%)	—	—	53
15	450	850(258%)	440(110%)	—	—	67
20	650	1270(86%)	430(79.5%)	—	—	67
25	800	1500(86%)	400(75.5%)	—	—	73

PHYSICAL PROPERTIES AFTER AGING 168 HRS. IN AIR OVEN AT 70°C.

Seconds @ 402°F.	200% Modulus psi	Tensile psi	Elongation %	ASTM Set Inches	Brittleness −65°	Shore Hardness "A"
10	160	240(171%)	420(131%)	—	—	59
15	820	1800(540%)	420(105%)	—	—	68
20	850	1620(112%)	350(65%)	—	—	69
25	870	1850(106%)	400(76%)	—	—	68

COMING!!!

WEST COAST REGIONAL MEETING OF THE WIRE ASSOCIATION

San Francisco, California

June 10, 1955

Palace Hotel

Mark the time and place on your calendar now. It will be a good meeting with a fine program for wire men.

The Program Committee hopes for a good attendance from Eastern wire industry men and extends a cordial invitation to all to come to San Francisco to participate in the activities being planned.

THE PROGRAM COMMITTEE

General Chairman

WILLIAM MOHR, Wire Mill Supt., California Wire Cloth Corp., South San Francisco.

Committee Members

EARL R. POTTER, Pres. & Genl. Mgr., Industrial Wire Products Corp., Los Angeles.

JOSEPH F. CONLAN, Treasurer, K. H. Davis Wire and Cable Corp., Los Angeles.

STERLING EDWARDS, President, E. H. Edwards Co., So. San Francisco.

Besides the regular program features, arrangements have been concluded to visit a wire rope mill in the San Francisco area. There is promise on the part of the Committee that the meeting will be one of interest and entertainment for all wire men—East and West.

Detailed program next month.

THE WIRE ASSOCIATION

RICHARD E. BROWN, *Executive Secretary*

453 Main St. • Stamford, Conn.

Cold GR-S Polymers for Wire Insulation

(*Continued from page 443*)

TABLE X

OZONE RESISTANT INSULATION

Meets the ASTM D574-46T Requirements for Physical Properties

GR-S 1503	100.00
Zinc Oxide	5.00
Hard Clay	75.0
Mineral Rubber M.P. 300°F.	15.00
Ozone Resistant Factice	200.00
Blend of Diarylamine—Ketone Reaction Product with N,N'diphenyl-p-phenylene Diamine	2.0
Zinc Laurate	2.0
Protective Wax	7.0
Paraffin Wax	3.0
Tetramethyl Thiuram Monosulfide	1.5
Butyraldehyde-Aniline Reaction Product	2.0
Diphenyl Guanidine	1.0
Sulfur	2.0
Total	415.5

Mooney Scorch at 250°F.

Scorch Time	9′
Cure Rate	3′

Tubing Data Based on Garvey Die

91.0 Grams Per Minute
41.5 Inches Per Minute
30.8% Swell Per ¼" Thickness

Test Specimen cured in press 307°F. (60 psi)

UNAGED PHYSICAL PROPERTIES

Minutes @ 307°F.	200% Modulus psi	Tensile psi	Elongation %	ASTM Set Inches	Shore Hardness "A"
3	470	560	470	0.40	69
6	480	600	510	0.42	67
9	460	560	390	0.40	67
12	470	550	370	0.38	69

ASTM D574-46T REQUIREMENTS

	450 Psi Min.	250% Min.	0.50 Max.	

PHYSICAL PROPERTIES AFTER AGING 168 HRS. IN AIR OVEN AT 70°C.

Minutes @ 307°F.	200% Modulus psi	Tensile psi	Elongation %	ASTM Set Inches	Shore Hardnes "A"
3	700	740	260	—	78
6	690	700	220	—	78
9	660	670	220	—	77
12	680	690	220	—	75

ASTM D574-46T REQUIREMENTS

—	400 Psi Min.	200% Min.	—	—

PHYSICAL PROPERTIES AFTER AGING 48 HRS. IN OXYGEN BOMB AT 70°C. & 300 PSI

Minutes @ 307°F.	200% Modulus psi	Tensile psi	Elongation %	ASTM Set Inches	Shore Hardness "A"
3	510	520	230	—	72
6	610	630	270	—	73
9	610	620	250	—	74
12	620	630	220	—	73

ASTM D574-46T REQUIREMENTS

	400 Psi Min.	200% Min.	—	—

Joint Metallurgical Societies Meeting in Europe— June 1st to the 18th

An important meeting on the scientific, metallurgical and production problems of the iron and steel and nonferrous metals industries will be held in Europe from the 1st to the 18th of June, 1955. This will be a joint meeting between the **American Institute of Mining and Metallurgical Engineers,** the **American Society for Metals** and the leading metallurgical societies in Great Britain, Germany, Belgium and France. The meeting has the full support of the iron and steel and nonferrous metals industries in these countries.

★ ★ ★

The objects of the meeting are to establish personal contacts between experts in the USA and in Europe, to provide opportunities for scientific and technical discussion, to enable visitors from the USA to see something of the metallurgical industries of Europe and to foster better understanding and cooperation among all concerned.

★ ★ ★

The meeting will cover ironmaking (including coke and ore preparation), steelmaking, mechanical working and heat treatment, both ferrous and nonferrous (including hot and cold rolling, forging, wire drawing and continuous castings, but not the foundry industry), refining and fabrication of nonferrous metals, heat treatment, surface treatment (including finishing and coating), metallurgical education and training in industry, and research.

★ ★ ★

The American Institute of Mining and Metallurgical Engineers and the American Society for Metals have formed a joint executive committee. The American Committee will arrange for American representation and handle all matters from the American angle.

★ ★ ★

By arrangement between the American Committee and the European Committee, Messers. Thos.

Cook & Son Ltd. have been appointed Official Travel Agents in Europe. They will make all travel and hotel arrangements in Europe; they will also handle travel arrangements to meet any American requirements.

Two Glass Fiber Concerns Merge

The new **L-O-F Glass Fibers Company,** recently formed by the merger of **Glass Fibers, Inc.,** into the former Libbey-Owens-Ford subsidiary, officially has begun operations.

★ ★ ★

The first public announcement from the new concern listed its Board of Directors which has been appointed to serve until the first annual meeting of stockholders.

★ ★ ★

New board chairman is **George P. MacNichol, Jr.,** who is also President of **Libbey-Owens-Ford Glass Company.** With L-O-F since 1920, Mr. MacNichol rose through sales ranks of the company and has served as Vice President in charge of sales, as Executive Vice President and was elected L-O-F President in April, 1953. He is also a director of the Wyandotte Chemicals Corporation, Ford Collieries Company, Wyandotte Transportation Company and the Rossford Savings Bank.

International Silver Buys Wire and Cable Firm

The purchase of the majority stock of the **Times Wire and Cable Company, Inc.,** of New York, and its eventual transfer to Meriden and Wallingford, was announced recently by the **International Silver Company,** in a statement issued jointly by **Maltby Stevens,** president of the International Silver Company, and **Sidney Gulden,** president of the Times Wire & Cable Company.

★ ★ ★

Times Wire & Cable Company will have 60 employees at the start and will be moved to Factory P, Wallingford, Conn., it is a manufacturer of specialized coaxial cables, widely used in the electronics industry for transmission of high frequency signals.

★ ★ ★

The operations of the Times Wire and Cable Company will be expanded under the supervision of the present management of the firm. **Sidney Gulden** and **Lawrence J. DeGeorge,** now connected with the wire and cable firm, will continue as top officials.

★ ★ ★

The stockholders elected as directors **Maltby Stevens, Craig D. Munson, Lee F. Revere, George L. Stringer, Edgar B. Ingraham, Sidney Gulden,** and **Lawrence J. DeGeorge.**

★ ★ ★

The Board of Directors elected as officers **Maltby Stevens,** chairman of the board, **Sidney Gulden,** president, **Lawrence J. DeGeorge,** vice president, **George J. Stringer,** treasurer, **M. Taylor Mayes,** secretary, **Gordon P. Cushman,** assistant treasurer, and **B. Allen Ingraham,** assistant secretary.

DIADUST

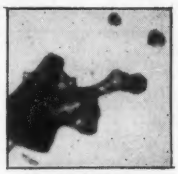
The finest always costs a little more

You get all three with DIADUST* . . . PURITY—QUALITY—BLOCKY SHAPES

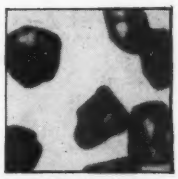
Diamond Powder is only a fraction of the many costs in wire manufacturing. But it helps to keep costs down when you get the best.

Wire drawing dies that are lapped and polished with DIADUST can be made faster and will draw more pounds of wire, cutting your costs materially. DIADUST, made by a special process, gives you all three . . . PURITY—QUALITY—BLOCKY SHAPES

Buy DIADUST with the utmost confidence in its greater effectiveness and uniform quality.



Ordinary 6-12 Micron Magnification 1000 X



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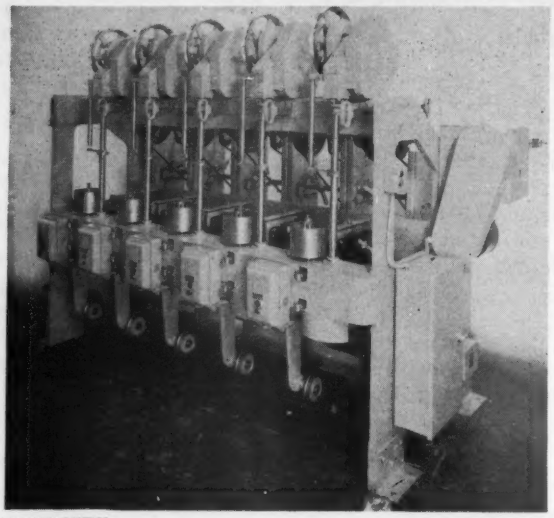
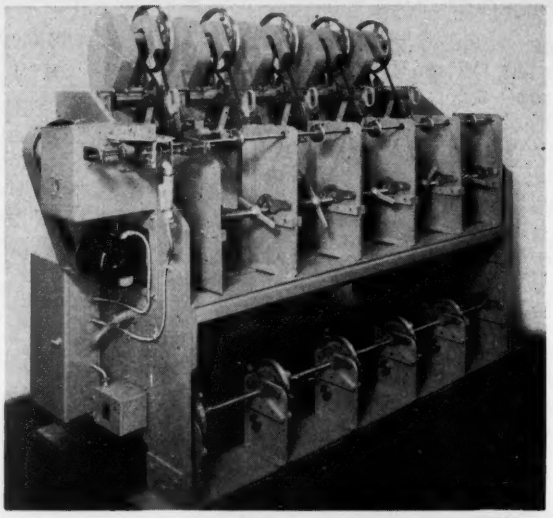


FRONT VIEW



REAR

Celebrating our 100th Anniversary

#2S-5-MBB INSULATION WINDING MACHINE

APPLIES SINGLE COVER TO 5 LINES OF WIRE SIMULTANEOUSLY. NOMINAL WIRE RANGE #15 TO #25 B & S GAUGES (.057" TO .018" OR 1.450 TO .455MM). STANDARD CAPSTANS 8" DIAMETER, BUT MACHINE ILLUSTRATED IS SPECIALLY ARRANGED WITH 12" DIAMETER CAPSTANS, IN PLACE OF STANDARD 8", FOR HEAVIER WIRES. SUPPLY WIRE LET-OFFS AND TAKE-UPS ARE AT REAR OF MACHINE.

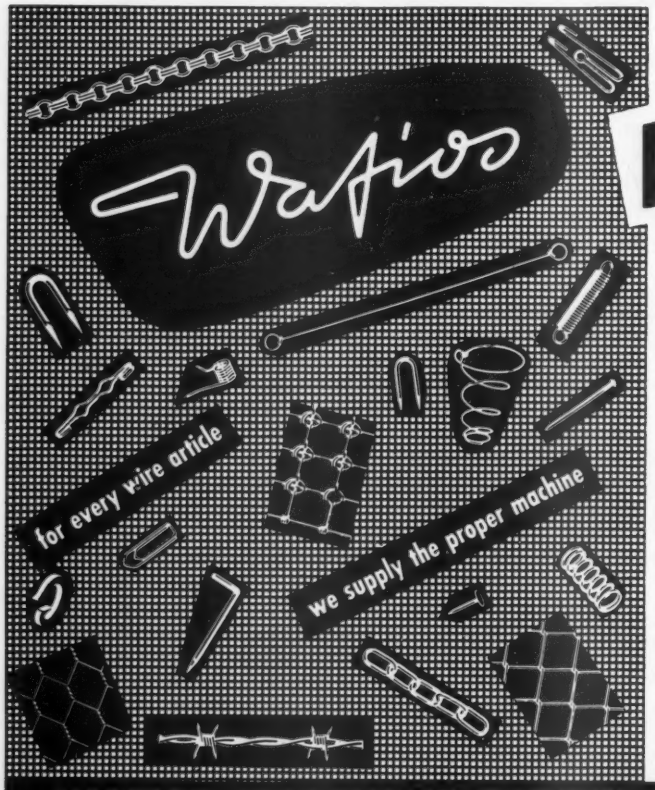
EST. 1855 AIMCO INC. 1915

"American" INSULATING MACHINERY COMPANY

REG. U.S. PAT. OFF.

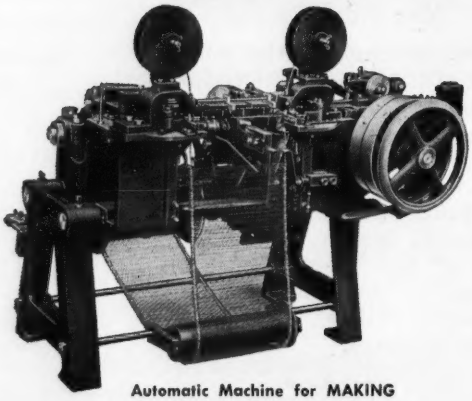
FAIRHILL AND HUNTINGDON STREETS

PHILADELPHIA 33 PENNSYLVANIA U.S.A.



AUTOMATICS

FOR THE WIRE TRADE



Automatic Machine for MAKING

WIRE BAG TIES

in length from about 2-3/8" — 13-3/4"
diameter of wire SWG 19 — 16

Sole Agents: Kurt Orban Co., Inc.
34 Exchange Place, Jersey City 2, N. J.

WAFIOS MASCHINENFABRIK REUTLINGEN 3 / GERMANY

Morgan Construction Co. Gets Contract for Bar and Rod Mills

A contract for construction of a merchant bar and rod mill for **Atlantic Steel Company** at Atlanta, Ga., has been received by **Morgan Construction Company.**

★ ★ ★

According to **W. W. Knight, Jr.,** Morgan's Vice President, construction and delivery will start in the Spring, 1956. It will be in operation in mid-Summer of 1956.

★ ★ ★

The company is also building rod mills for **American Steel & Wire** and **Bethehem Steel.**

★ ★ ★

The Atlantic mill is part of a $10,500,000 expansion program and is the hub of the expansion.

★ ★ ★

The new mill will be able to produce up to three-miles-a-minute of .218 diameter rods, and up to two-inch in diameter, straight steel pieces. Its top is four by four inch beams and channels.

★ ★ ★

The Main building to house the new mill will be 760 feet long and 45 wide with a large motor room addition.

★ ★ ★

The expansion also includes the installation of another electric furnace.

New Totally-Enclosed Motor

An improved motor for duties requiring a completely enclosed unit and conforming to the dimensional standards recently adopted by NEMA has been placed in production by **U. S. Electrical Motors Inc.** It has been designed more compactly than previous types and the same horsepower is provided in less space. Improved methods of manufacture and superior materials have resulted in higher electrical characteristics and closer tolerances. Greater protection is provided by improved types of enclosure, precision register fits, closer tolerances in machining, and numerous structural refinements. No general disassembly is required to gain access to the bearings. This new motor, designated as Type J, is engineered for operation where fumes, dusts and moisture are prevalent. The externally exposed surfaces are of cast iron for corrosion resistance.

★ ★ ★

Type J is being produced in ratings from 1 to 10 horsepower and may also be had in the fanless type for lower ratings from 1 to 1½ horsepower.

★ ★ ★

A new bulletin, No. 1879, describes the motor. A copy may be obtained by writing to U. S. Electrical Motors Inc., Box 2058, Los Angeles 54, California.

New Insulating Enamel Announced

Commercial availability of a newly-developed insulating wire enamel—permitting significant advances in the electrical insulating materials field—has been announced by **General Electric Company's Chemical Materials Department.**

★ ★ ★

S. L. Brous, Department general manager, said that the new high-temperature coating is capable of withstanding 155° C heat for 3,000 hours without loss of dielectric strength. Life tests data indicates

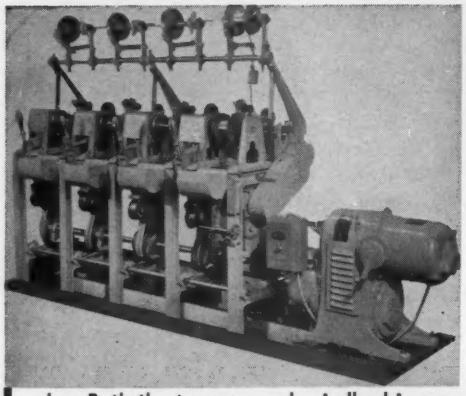
WILLEY'S
TUNGSTEN CARBIDE

METALS
DIES
TOOLS
for the Wire Industry

Rough Cored Standard Dies
(from stock)
ROUND SQUARE HEXAGON OCTAGON

Rough Cored or Finish Ground
(Immediate quotations on receipt of your prints—Fast delivery schedules)
SPECIAL DIES WEAR PARTS MANDRILS
NIBS—HEADING AND EXTRUSION DIES

For complete information:
Willey's Carbide Tool Co.
1340 W. VERNOR HWY. • DETROIT 1, MICHIGAN



1900-HV MULTIPLE SPINDLE SPOOLER

SPECIFICATIONS
Size Range: .010" to .080" or heavier if soft and many flat wire sizes.
Max. Spool Size: 16" flange diameter.
Capacity: usually 4 to 8 spindles.

The 1900-HV Spooler is a rigid, precision machine which will consistently produce a uniform, dense wire lay. Both the traverse and spindle drives are regulated through wide-range, stepless, variable speed units, eliminating change gears. The 1900-HV is completely adaptable to your particular constant or changing demands. All controls are positive. Adjustments are made accurately with the spooler in operation and without tools.

Both smooth acceleration and rapid stopping is obtained through a single lever at each station. Spool changing is simple and rapid. Anti-friction bearings are used on all shafting and spindles.

Your special requirements can be incorporated into the design. Each machine is delivered ready for operation from your power supply. Payoff stands furnished as extras.

Consult us on your spooling problems.

ROBERT J. EMORY COMPANY
31 East Runyon Street Newark 5, N. J.

this heat-resistance will permit design of electrical equipment with increased ratings and greater compactness.

★ ★ ★

Designated "Alkanex" wire enamel, the new material is currently produced at the Department's chemical plant in Schenectady, New York. Regarded as a major development in electrical insulating materials, Alkanex wire enamel resulted from scientific discoveries by G. E.'s Research Laboratory as to how insulating materials might better resist heat.

★ ★ ★

The G-E executive said that Alkanex wire enamel will help permit redesign of Class A electrical equipment to Class B standards. The new insulating material has been successfully tested on various types of motors, control and other equipment.

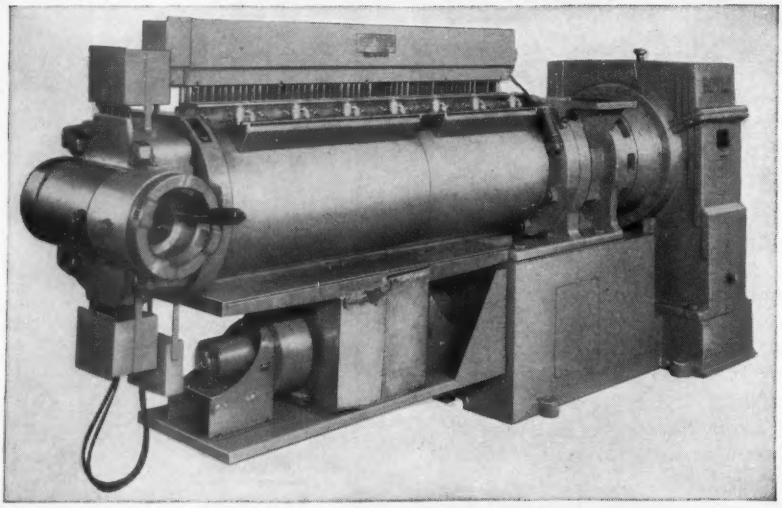
★ ★ ★

Alkanex wire enamel, and related developments recently announced by General Electric's Re-

THE ROYLE ALL • ELECTRIC SPIROD

The latest addition to the Royle line, these all-electric Spirod extruders are built to supply — and hold — the higher and accurately zoned operating temperatures that are essential to present extrusion processes. This outstanding performance is only possible with the inclusion of a proportioning controlled system of high velocity evaporative cooling combined with tubular resistance heating — just one of the many features that assure economical, dependable production.

Available in standard sizes 1⅛" through 12"



No. 5 8½" ROYLE EXTRUDER for applying plastic insulation to cable up to 4½" diameter.

JOHN ROYLE & SONS

ROYLE PATERSON N. J. 1880

PIONEERED THE CONTINUOUS EXTRUSION PROCESS IN

London, England
James Day (Machinery) Ltd.
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Home Office
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SWandale 4-5020

Los Angeles, Cal.
H. M. Royal, Inc.
LOgan 3261

PATERSON 3, NEW JERSEY

search Laboratory, will allow engineers to increase the horsepower of electric motors without increasing their size. Motor size and weight reductions will be made possible because of Alkanex wire enamel's space-saving and heat-resisting properties.

★ ★ ★

Designed for application to bare copper wire or aluminum, Alkanex wire enamel is also said to possess excellent dielectric and mechanical properties. G-E engineers said that the new material helps meet the demand for superior heat-resistant wire for electrical insulating purposes.

★ ★ ★

Technical information on Alkanex wire enamel may be obtained by writing the Chemical Materials Department, General Electric Company, Bldg. 77, River Road, Schenectady, N. Y.

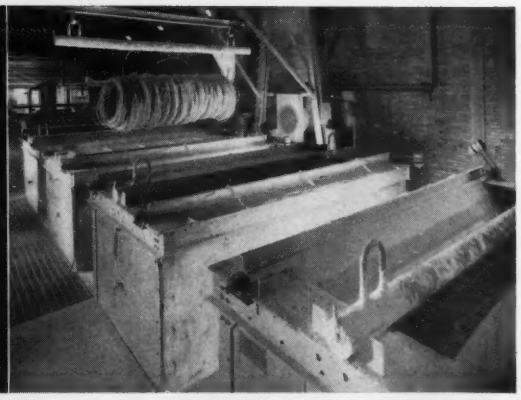
Roebling to Rebuild East River Bridge

The John A. Roebling's Sons Corporation has signed a $2,198,-169 contract with the City of New York for the replacement of important structures on the Manhattan Bridge over the East River, it was announced by **Charles R. Tyson,** Executive Vice President of the company. The Trenton, New Jersey firm, a subsidiary of **The Colorado Fuel and Iron Corporation,** will furnish all labor and materials necessary for replacing cable bands and suspenders on the bridge.

★ ★ ★

The 46-year old span connecting the boroughs of Manhattan and Brooklyn is one of the world's most heavily traveled bridges. It has a main span of 1,470 feet, supported from four cables each 20¾ inches in diameter. The total length of each of the cables is 3,224 feet between center lines of anchorage ends. The continuous wire lengths of the four cables totals 23,170 miles, and the ultimate strength of each of the cables is approximately 28,300 tons.

carl mayer
HI-SPEED REGISTERED
ROD BAKERS



Faster baking, greater fuel economy, maximum production efficiency are just a few of the results of the exclusive heating arrangement of the Carl Mayer Hi-Speed Rod Baker. It also has a patented blow-off feature which removes moisture without damage to coils.

Here are just a few of our many satisfied customers:

American Steel & Wire Co.
Atlas Steel Co.
Colorado Fuel & Iron Corp.
Crucible Steel Co. of America
B. Greening Wire Co., Ltd.
Indiana Steel & Wire Co.
Jones & Laughlin Steel Corp.
Republic Steel Corp.

Write for Bulletin No. 350

Patent Nos.
U. S. A. 2,296,361
2,323,828
2,235,559
Canada 396,144
401,589

THE carl mayer CORP.
3030 EUCLID AVE., CLEVELAND 15, OHIO
OTHER PRODUCTS: Core Ovens • Mold Ovens • Welding Rod Ovens • Heat Treating Ovens & Furnaces • Special Processing Equipment and Accessories.

A RUGGED, DEPENDABLE
Wire Measuring Machine
for fast, accurate runs!

Wire is easily "loaded" into measuring machine from the side or the rear without having to feed through guide bushings. Brake stops measuring wheel instantly when wire leaves measuring rolls. Predetermined units will automatically stop wire at desired length. Very accurate speeds to 2500 ft. per minute.

MODEL "L-25"
Capacity .030 to 1 in. Tachometer to govern rate of speed is optional.

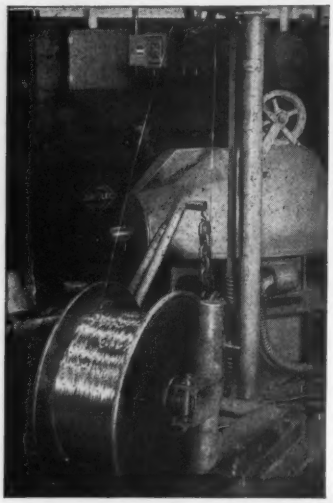
DURANT
MANUFACTURING CO.
1918 N. Buffum St.
Milwaukee 1, Wis.
118 S. Water St.
Providence 3, R I.

Send for Catalog No. 40

Representatives in Principal Cities

PRODUCTIMETERS
SINCE 1879 *Count Everything*

Balanced and True...



mean high speeds for you!

Faster, faster, is the production cry! And Apco Mossberg is constantly at work designing and refining to make better reels for high speed wire drawing.

Apco Mossberg Reels are manufactured to extremely close tolerances . . . with particular emphasis on trueness and balance. This has been going on for over half a century, beginning with the original Frank Mossberg Company.

You will be interested also in Apco Mossberg's engineering service. Each and every inquiry about steel reels, spools or bobbins is given individual treatment, so bring your next problem to Apco Mossberg. Suggestions and solutions will be offered without obligation. Write for details.

Pacific Coast Representative
GORDON PROFFITT
Matson Building
215 Market St.
San Francisco 5, Calif.

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HUGH P. WILLIAMS & CO.
47 Colborne Street, West
Toronto, Ontario, Canada

The original Frank Mossberg Company

APCO MOSSBERG COMPANY
ATTLEBORO, MASS.

The Roebling Corporation is the builder of another historic span over the East River, the famous Brooklyn Bridge, once the longest suspension bridge in the world. Other important bridges to which the Roeblings have contributed their products and experience include the George Washington Bridge in New York and the Golden Gate Bridge in San Francisco.

Transmission Manufacturers to Merge

Reliance Electric & Engineering Company has negotiated for the acquisition of the **Reeves Pulley Company** of Columbus, Indiana, it was announced in January by **J. W. Corey,** company president. Negotiations which have been conducted with **Carl M. Reeves,** president, and **Robert F. Reeves,** vice-president, of the Indiana company, were subject to approval of the directors of Reliance on January 21, 1955 and of Reeves shareholders on January 26th.

* * *

Starting fifty years ago as an electric motor manufacturer in Cleveland, Reliance now has plants in Euclid and Ashtabula, Ohio, and a subsidiary company in Canada and is a major producer of electric motors and electronically controlled drive systems which play a prominent role in automation for industry. Reeves is the leading manufacturer of infinitely variable speed transmissions and mechanical vari-speed drives, the outgrowth of an early invention of the adjustable pitch pulley, and for its products is a large user of electric motors such as Reliance manufactures. These two companies, operating as a unit, will offer a broad line of variable speed drives to serve industry.

* * *

The management at Reeves will remain intact and it will continue as a separate division. Reeves employs 550; Reliance has over 2400 on its rolls.

* * *

The building will be completed by May 15th.

WHAT'S IN A SLOW BURN?

There's more to a slow burn than just temper.

When radio or TV hook-up wires get crossed, there may not always be sparks but there's a lot of heat generated — sometimes enough to start a good flame on the insulation.

When this sort of thing happens, the flame can be retarded and even extinguished if a NELCO saturant has been used on the insulation. Our laboratories worked long and hard to discover just the right combination of materials that would give a fire-retardant saturant that would also meet all other requirements of the radio and TV hook-up wire people.

The NELCO saturant we have developed, besides its outstanding characteristic of being a fire-retardant, has many other fine qualities. For example:

Its lightness in color makes wire more attractive, more sellable.

Its resistance to discoloration means finished wire that will not fade or become untraceable.

Its quick-drying properties, essential in mass production operations, are unequalled.

Here is another NELCO saturant, specially developed to do a tough job . . . as are all our saturants and lacquers.

When you do a slow burn over inefficient saturants, write to us for help. We're used to finding just the right solution for other people's problems.

Chemical Products
CORPORATION
King Philip Rd., East Providence, R. I.

• The top production rates designed into your machines are yours to profit by when you call upon Hans C. Bick for modern lubricants, coolants, and cutting fluids. Manufactured by specialists with 23 years' experience, these compounds are engineered for rigorous conditions such as high feeds, speeds and pressures. Furthermore, you'll like the friendly manner in which our engineers cooperate to solve the toughest problems. To get the most from your machines and tools, always call upon Hans C. Bick to smooth and cool the way.

Hans C. Bick, INC.

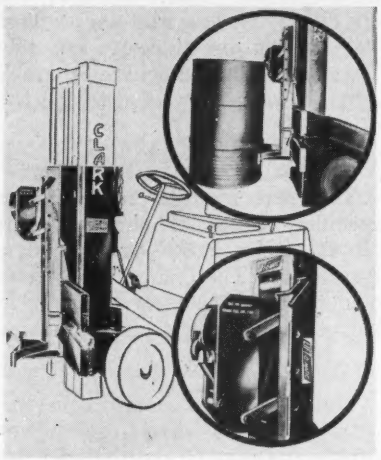
READING, PENNSYLVANIA

New Power Truck Attachment For Handling Drums

Marvel Industries, Inc., 2224 Cleveland St., Evanston, Illinois, has announced a new Lift-O-Matic Power Truck Attachment for handling drums.

★ ★ ★

Made to fit any power truck, the Lift-O-Matic can be attached or removed in a few minutes by one operator. Any drum can be handled, fibre or steel, regardless of



Lift-O-Matic Attachment

diameter, height, bead or rim sizes. The Lift-O-Matic is mechanical and completely automatic. No additional power controls are needed, and pick up and release are effected through raising or lowering the truck cylinder. Lift-O-Matic allows transportation, tiering and exact placement without the use of pallets or dunnage.

★ ★ ★

A descriptive bulletin will be sent upon request.

Lindsay's Wire Reference Year Book and Directory

This annual publication, issued by **Alfred Hinde, Ltd.,** Clarence St., Wolverhampton, England, besides product listings, contains a bibliography of articles published by leading trade magazines and a "Who's Who in the Wire Industry." The directory is published in six languages. It will be issued in June and will sell for 10/ before publication or 15/ after it is out.

START SAVING in your Die Finishing Rooms

•

Double your Refinished Tungsten Carbide Die Production

CUT labor costs ½ with the New type "M" automatic

DYKREX
"IT CORRECTS THE DIE"

Polishing Machine

It's factory assembled—just plug it in to nearest electric outlet.

ROOS TOOL & MFG. DIVISION
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manufacturers of
Wire Die Finishing Machinery

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Western Union
Teletype Service
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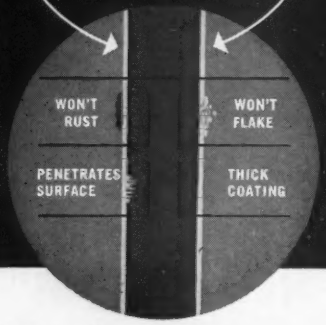
The Standard of the Wire Industry

Here's why you should coat high and low carbon steel rod with

BORAX 5 MOL.



No Dust... For a cleaner shop—pleasant working conditions and easier house keeping. Borax-coated rod does not dust or flake, can be held in storage longer and is pleasanter to handle.

No Baking... The Borax solution penetrates the porous surface of the metal, neutralizing deepseated acid, and eliminating the need for baking.

Longer Storage... The continuous film of Borax inhibits the formation of rust for a considerable period—particularly important where several days may elapse between coating and drawing.

Economical... A single dip in the Borax bath provides a thick durable coating which is very valuable where the wire is to be drawn in several stages.

Write to our Technical Department for further information.

PACIFIC COAST BORAX CO.

DIVISION OF BORAX CONSOLIDATED, LIMITED

NEW YORK • CHICAGO
LOS ANGELES • CLEVELAND
PHILADELPHIA

MANUFACTURERS OF FAMOUS "20 MULE TEAM" PACKAGE PRODUCTS

Fine Gold Wire Automatically Welded

A new multi-purpose automatic machine has been developed by **Federal Tool Engineering Co.,** Cedar Grove, N. J., to feed, weld, form and cut-off .001 wire to precision specifications.

★ ★ ★

This new miniature parts welder was designed to weld whisker wires on diodes and will weld .001 Gold wire, one half the thickness of a human hair. Wire is fed directly from the reel and welded to the top or side of the pin. This is the first machine whereby .001 wire can be welded to the top of pin.

★ ★ ★

The wire may be formed to a specified "U" or "S" shape and cut off at either a 30° or 45° burr-free angle. The end of the wire is held to within plus or minus .005 inches radius of the pin centerline.

★ ★ ★

The machine comes complete with capacitor discharge power supply and may be purchased from Federal Tool Engineering Co., Cedar Grove, N. J., manufacturers of standard and special purpose equipment for small and miniature parts welding.

Adds Diamond Compound to Line

Anton Smit & Co., 333 West 52nd St., New York 19, N. Y., has announced the addition of a new diamond compound, designed especially for micro finishing and precision lapping.

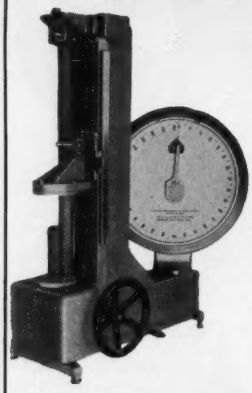
★ ★ ★

This compound is scientifically prepared for economy and efficiency in all operations where diamond powders are used and guaranteed full satisfaction or a refund of its cost.

★ ★ ★

It is supplied in tubes and with film applicators and comes in grades from 1 to 60 in micron sizes from 0-2 to 60. A circular, with complete information and prices, is available upon request.

let us solve your SPRING TESTING problems

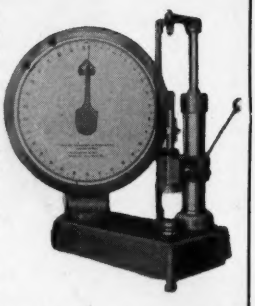


Model SF 21 T Table model for the testing of tension and compression springs. Indication on vernier measuring bars — Stop for serial testing — Hand-operated via spindle or motor drive.

Ranges from 200 lbs. to 2000 lbs.

Model SF 25 E For the testing of tension and compression springs. Handlever - operated — Stop adjuster for the testing of three values in one operation based on spring diagrams. Fully automatic as model A S F.

Ranges from 20 lbs. to 200 lbs.



Keep pace with increasing demands for better quality by using PROBAT equipment to test your springs. We make static and dynamic testing machines for testing all types of springs, with measuring ranges from 1 lb. or 1/16 inch/oz. up to 120,000 lbs. and more.

PROBAT

Spring Testing Machines ranging from 1 lb. up to 120,000 lbs. and more. Specialists for torsion testing.

Inquiries invited

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Phone: CAnal 6-0545

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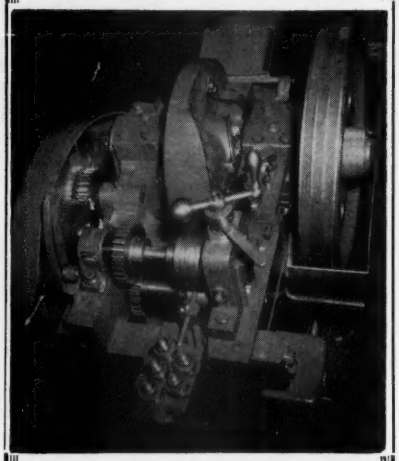
STAPLES PER MINUTE!!!
are made on the
HUMPHREY STAPLE MACHINE



Top View, showing Fly Wheel & Gears

MAKES: FENCE Staples
Poultry Netting Staples
Double Pointed Tacks

48 different leg lengths
Gauges 8 through 18

Efficient, Compact
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Models: Belt or Motor Drive

Prompt Deliveries

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Bulletin on Chain-Link Fence Machines

Arthur Blashill & Co., 91 Webster St., Worcester, Mass., has issued an 8-page bulletin describing and illustrating their 1955 line of "Invincible" chain-link fence making machines.

★ ★ ★

These machines have been redesigned and improved in the last two years to produce chain link fencing at a 50% higher production rate, at the same time occupying less floor space. Important wire savings are also claimed. The line is designed for all standard gages, meshes and widths and require less power than older models.

★ ★ ★

Another feature is quiet operation. A weaving room equipped with Invincible machines need no longer sound like a boiler shop, the makers state.

★ ★ ★

The machines are designed for long continuous service, are precision made, have ball and roller bearings throughout and are provided with enclosed gears running in a bath of oil.

★ ★ ★

The manufacturer has had 50 years of experience in producing automatic wire machinery and 20 years experience in making chain-link machines.

★ ★ ★

A copy of the bulletin will be mailed upon request.

Booklet on Research Facilities

The Battelle Memorial Institute, 505 King St., Columbus 1, Ohio, has issued a 24-page illustrated booklet entitled: "Battelle Research—How It Can Help You Solve Technical Problems."

★ ★ ★

It opens with a chart showing the branches of industrial science covered by their facilities, which embraces the entire field of technology. This is followed by a section describing the place of research in modern business.

★ ★ ★

BUNCHING
(TWISTING)
AND
STRANDING
IN THE WIRE AND GENERAL MANUFACTURING PROCESSES

SPECIALIZED ENGINEERING
AND
SPECIALIZED FACILITIES
AT YOUR SERVICE

Expanding application of twisting principles to the production of many products is reflected by an ever-increasing demand for both H-D standard equipment as well as machines especially engineered to solve varied production problems. Week after week surprising new uses are developed through the close cooperation of our engineering department with manufacturers in many fields.

Write today for our New Technical Bulletins. Tell us what you make—or contemplate making and your inquiry will receive prompt attention.

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MACHINE CO., INC.
2231 E. ONTARIO ST.
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DIAMOND POWDER

We Believe That . . .

- The finest, properly graded Diamond Powders are more economical to use than paste compounds.
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- Purity of diamond powders is essential to properly finished diamond dies. Beware of bargain prices!
- Danforth grading is accurate—you get what you order.

COMPLETE RECLAIMING SERVICE

The DANFORTH PROCESS of reclaiming produces powders that are *guaranteed* to be 99% or better pure. Some reclaiming work runs as low as 80%—but never DANFORTH'S.

Write today for information on new & reclaimed powders.

C. W. DANFORTH COMPANY

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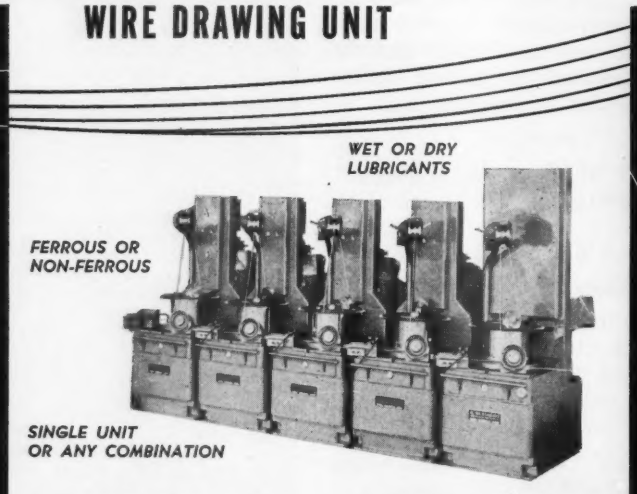
P.O. Box 448 **Youngstown, Ohio**

AETNA-STANDARD WIRE DRAWING UNIT



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AETNA-STANDARD ENGINEERING COMPANY, LTD. . . TORONTO, ONTARIO, CANADA

Booklet on Steel Sheets and Wire

A special booklet on steel sheets and wire is available from **Continental Steel Corporation,** Kokomo, Ind. This pocket-size guide contains wire specifications — sizes, tempers, shapes and finishes of wire, and a valuable table of sizes, weights, and lengths of round steel wire by steel wire gauge . . . "Manufacturers' Wire for a Thousand Uses." Also illustrated and described are several types of Continental steel sheets — Continental Galvanized, Copper Steel, Konik Steel, Galvannealed, and Dull Coat.

New Bulletin on Straightening, Cutting Machines

"Wire Straightening and Cutting Machines" is the title of Bulletin 55-2, published by the **Lewis Machine Co.,** describing the Lewis 2-C wire straightening and cutting machines for the economical production of wire and wire products.

★ ★ ★

Lewis 2-C wire machines are available in two wire size ranges—No. 2-C3 for wire from 1/16″ to 3/16″, and No. 2-C4 for wire from 3/32″ to ¼″. Features of 2-C wire machines are described, and chart makes it easy to select machine for production requirements. For additional information on Lewis 2-C wire machines or other Lewis wire straightening and cutting machines for wire from .012″ to ¾″. Lewis Bulletin 55-2 is available from The Lewis Machine Co., Department 1A, 3441 East 76th St., Cleveland 27, Ohio.

Directory of Commercial and College Testing Laboratories

This Directory is a successor to the Directory of Commercial and College Laboratories published in 1947 by the U. S. Department of Commerce, National Bureau of Standards, as Miscellaneous Publication M 187. Responsibility for its compilation and publication has been transferred from the National Bureau of Standards to the **American Society for Testing Materials**

by agreement between the two organizations.

★ ★ ★

The Directory lists the locations of testing laboratories equipped and prepared to undertake testing on a commercial or fee basis. Information is given concerning 278 commercial testing laboratories and their 151 branches or offices. There is also presented a list of the laboratories of 86 colleges that are prepared to do testing under certain conditions. Research and consulting laboratories are not listed unless they also are engaged in testing on a commercial basis.

★ ★ ★

The Directory is designed to be of assistance to purchasers not equipped to make their own tests, and who therefore have hesitated to buy on specifications. The knowledge that they can at any time call on testing laboratories to check deliveries made to them on specifications should induce many purchasers to take full advantage of the specification method of buying. It will also be of value to small manufacturers and others seeking testing laboratory services.

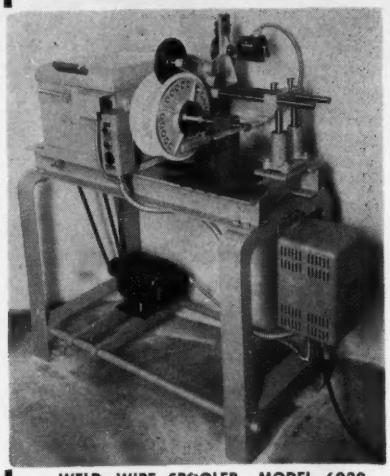
★ ★ ★

The Directory will give the user a good indication of the laboratories most likely to be prepared to undertake the tests desired. Copies may be purchased from the American Society for Testing Materials, 1916 Race Street, Philadelphia 3, Pa. Price $1.00.

Seymour Manufacturing Modernizes Plant

Seymour Manufacturing Company, Seymour, Conn., produces of copper and non-ferrous alloy sheets, wire and strips, now has a $2 million modernizing program under way which will replace most of its sheet and strip production line with new continuous-production rolling, heat-treating and slitting machinery. The new processes are expected to improve surface finish and to hold material to closer tolerances, as well as to improve production capacity.

SPOOLER FOR WELD WIRE



WELD WIRE SPOOLER, MODEL 6030

SPOOLING AND COILING MACHINES FOR ALL PURPOSES

THE BOYD 6030 SPOOLER

is designed for the thread layer winding of weld wire. The traverse mechanism is a single screw solenoid actuated for positive "No-dwell" reversing running in a constant shower of oil. Traverse lengths are easily adjusted from one-half to eight inches or longer if desired. Therefore, this machine can be used for other winding requirements.

Ball bearings throughout give free running and long life to all wear points.

Predetermining counter and measuring device provide automatic stop of wind at desired footage and hand operated clutch allows manual control.

The tailstock has a quick release action either hand or foot controlled.

The machine is powered by a motor with control for slow starting.

Send for full particulars

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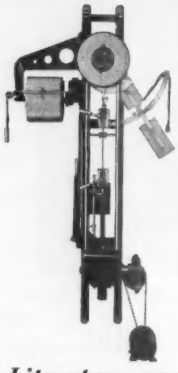
provide authoritative equipment to fulfill the various specifications for materials used in the

WIRE INDUSTRY

MODEL XL

Meets specifications for tensile and elongation of elastomeric jackets on insulated wire — either Underwriters Laboratory** or the American Society for Testing Materials.**



MODEL J5

Fulfills the requirements for the evaluation of tensile, yield point and ultimate elongation for tire wire.

**Mention of these organizations does not constitute endorsement by them.

Literature upon Request

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Sheffield is prepared to serve your needs quickly for manufacturers wire in any quantity. Get in touch with your nearest Sheffield office.

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SHEFFIELD STEEL CORPORATION

HOUSTON, TEX.

Continental Can Reaches Half Century Mark

Continental Can Co., New York, founded in 1904, celebrates its Fiftieth Anniversary this year. The first products were shipped from the original plant in Syracuse in 1905.

★ ★ ★

The company started with a capital of $500,000 and, when incorporated in 1913 had recorded gross sales of 6 million dollars. Last year sales topped the half billion mark. It now operates about 90 plants in the U. S., Canada and Cuba, and is organized along product lines.

★ ★ ★

Roebling Announces New Strong Rope Line

Developments in wire manufacture and rope fabrication now permit **Roebling** to announce a new line of wire ropes, with steel cores, having 15% greater strength than the strongest grade marketed heretofore.

★ ★ ★

In the past, one of the obstacles to rope of higher strength was a proportional decrease in other qualities as the strength went up. The new rope has higher resistance to wear from bending and abrasion. Laboratory tests as well as on-the-job observations, over several years have proved these facts. Consequently, the new rope has both higher strength and longer life. It will be made principally in preformed construction.

★ ★ ★

The new rope will be obtainable in sizes ranging from 1/4" to 3-1/2".

American Brass To Build Plant on Coast

The American Brass Company will soon begin construction of a new brass mill in the Paramount district of Los Angeles, California, according to a statement issued by **John A. Coe, Jr.,** company president.

★ ★ ★

"Just as soon as we can complete the engineering detail, which

has been in progress for some time," said Mr. Coe, "we expect to start the construction on property purchased for the purpose in 1948. Our land comprises about 45 acres situated easterly of Garfield Avenue and northerly of Compton Boulevard."

★ ★ ★

The new mill will be built for the production of copper and copper-base alloys in the form of sheet, strip, rod, tubing and drawn copper products. Annual capacity is estimated to be about 30,000,000 pounds.

★ ★ ★

The building will be one-story construction of heavy steel and will be equipped with overhead crane service throughout. The mill and office will require 330,000 square feet of floor space, and, together with the land, will involve an expenditure of $13,000,000. When in full operation, the mill will furnish employment for approximately 500 people. Personnel will be recruited locally.

★ ★ ★

The company's statement follows two other announcements made recently in which The American Brass Company revealed plans for the construction of a $25,000,000 aluminum fabricating plant at Terre Haute, Indiana, and a $2,500,000 production facility for flexible metal hose and tubing at Mattoon, Illinois. All three projects will be started this year. When completed, The American Brass Company will have a total of 12 factories strategically located throughout the United States, and one in Canada.

Leaders in Abrasive Cutting Unite

The American Chain & Cable Company, Inc. of Bridgeport, Conn., whose Campbell Machine Division is the leading manufacturer of abrasive cutting machines is now able to offer more complete service to the metalworking industry. Its officials announced on January 25th, the purchase of **The Allison Company** of Bridgeport, Conn., which has specialized for 35

PEAK PERFORMANCE with

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DRAWING COMPOUNDS

Over thirty years of successful experience with leading wire manufacturers provide the greatest assurance of better production with PERMAG wire drawing compounds.

Formulated in the Magnuson laboratories for guaranteed peak performance, PERMAG compounds consistently prove themselves ideal for all types of wire drawing, for both production and economy.

FOR WIRE CLEANING, too, PERMAG offers a group of completely tested formulas that will eliminate pickling trouble and speed drawing production.

A Magnuson representative will be glad to demonstrate the proven superiority of PERMAG cleaning compounds. Or, if you wish, a letter will bring you a complete analysis of your problem, without obligation.

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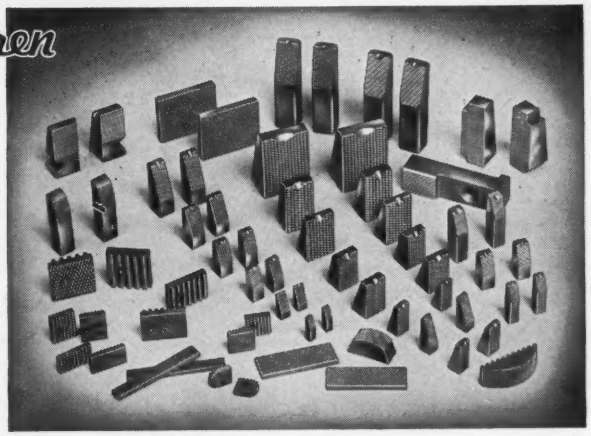
JAWS....

for Wedge Grips, Pullers and Tensile Testing Machines of all makes are available either from stock or manufactured to order. A Sjogren jaw, made to meet your requirements, guarantees you service.



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Used by Wire Men Who Want the Best!

SJOGREN TOOL AND MACHINE CO., INC.

WIRE PULLERS • WEDGE GRIPS • JAWS FOR ALL MAKES OF PULLERS AND TESTING MACHINES • CAGE ROLLERS • SWAGING HAMMERS • POINTING DIES • WIRE SPOOLERS

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Automatic Wire Weaving Looms

Other products we furnish:

Fourdrinier Looms

Semi-Automatic Looms

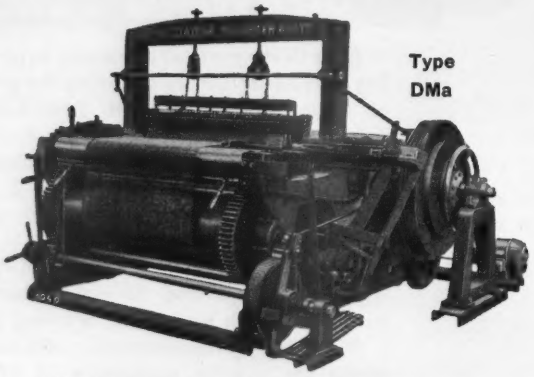
Mesh Assembling Looms

Automatic Pirn or Bobbin winders

Beaming Devices

Weaving Reeds

Wire Crimpers for wires up to 5/8" dia.



Type DMa

Weaving Range 1 to 20 mesh per inch with wires up to .100". When used semi-automatically, meshes with wires up to .240" dia. can be woven.

We have a complete line of Looms from the coarsest mesh up to 450 mesh per inch.

For further information write us giving details.

CEDAR WEST TOOL COMPANY, INC.

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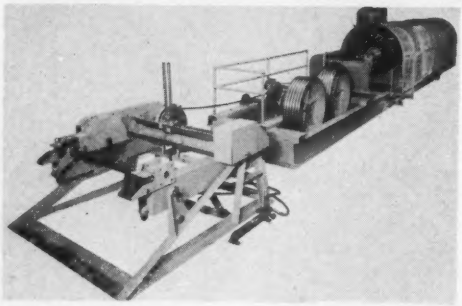
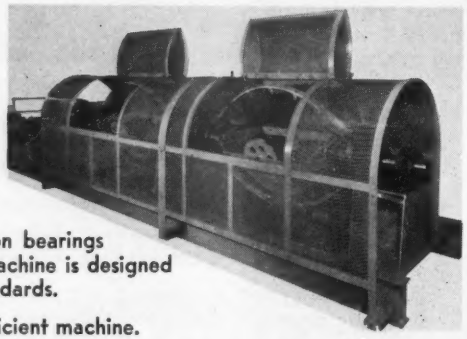
THREE-WIRE HEAVY DUTY TWISTING MACHINE



Built to handle wire from #14 to 500,000 circular mils in size on cradle reels.

Cradle reels either 30", 36" or 48" in diameter.

Rotor speeds from 800 r.p.m. to 30 r.p.m. controlled by gear box and dual drive.



Capstans either single with fleeter sheave as shown or double with diameters of 30", 36" or 42". Rates of lay from 1½" to 36".

Welded steel frame, anti-friction bearings and multiple roll guides. The machine is designed and built to our usual high standards.

An exceedingly versatile and efficient machine.

THE EDMANDS CO., **228 ABORN STREET PROVIDENCE 3, R. I.**

years in the manufacture of abrasive cutting wheels.

★ ★ ★

Founded in 1919 by the late Harvey Allison, The Allison Company has worked closely with the Campbell Machine Division for many years. The research departments of the two companies have together developed many improved abrasive cutting techniques. It is felt that combining the two companies will permit rapid and orderly development of both machines and wheels.

★ ★ ★

Officials of American Chain & Cable Company state that The Allison Company, which has a position of leadership in its field, fits in perfectly with the Campbell Machine Division and customers of both should benefit by the affiliation in many ways.

★ ★ ★

The predecessor company of American Chain & Cable was founded 50 years ago last December 23rd, as the Weed Chain Tire Grip Company.

Wire Fence Mill of C.F.&I. Expanded

A modern annex has been added to the fence mill of **The Colorado Fuel and Iron Corporation's** Wickwire Spencer Steel plant at Buffalo, New York, it was announced by A. F. Franz, president. The new structure, measuring 105 feet by 40 feet, houses chain link fence galvanizing facilities, and is the key piece of equipment in the plant's program for improving methods of handling, storing, processing, and loading Realock Fence.

★ ★ ★

The multi-windowed unit provides an entirely new area of operations for the cleaning, preparing, and hot dipping of chain link of different sizes. Its advanced technical features include modern controls for temperatures at the flux and zinc baths, improved take-up methods to eliminate old style laborious handling, and a greatly improved ventilat-

ing system that makes a complete change of air in the galvanizing room once every two minutes.

★ ★ ★

The Buffalo plant is CF&I's eastern center for the manufacture of Realock chain link fence, gates and fittings. The plant also produces many types of steel rod and wire, and is an important supplier of iron and steel to other CF&I plants as well as to outside users. The Colorado Fuel and Iron Corporation has 14 plants in seven states.

New Polyethylene Plant In Operation

The new Union Carbide polyethylene plant at Seadrift, Texas, has been put into full operation, increasing the industry's production of this versatile plastic by more than 25 per cent, it is announced by **George C. Miller,** President of **Bakelite Company,** a Division of **Union Carbide and Carbon Corporation.**

★ ★ ★

"Full-scale operation at this new Seadrift plant," Mr. Miller stated, "comes just in time to meet the rising demand for polyethylene and will make possible continued expansion of polyethylene applications. This plant will add a rated capacity of 60,000,000 pounds to the industry's production — more than the entire industry produced in 1950."

★ ★ ★

Seadrift makes the third polyethylene plant that Union Carbide has in operation, and a fourth plant is scheduled to go into operation at Torrance, Calif., in about a year. In addition to the original plant built at South Charleston, W. Va., in 1943 and since expanded to a rated annual capacity of 70,000,000 pounds, a 60,000,000 pound plant at Texas City, Texas, went into operation at the end of 1953.

Bulletin Summarizes 17-7 PH Wire Data

A three-page bulletin published by **National Standard Company,**

VINYLS for...

CRITICAL CUSTOMERS

For the past ten years we have specialized in the compounding of Vinyl extrusion and injection molding compounds to specifications, or developing compounds for a specific use.

Underwriters' approved standard compounds are available in all colors for POT, T, TW, 80 Degree C, 90 Degree C and 105 Degree C wires. We also have a compound which will meet requirements of Military Specifications MIL-W-5086.

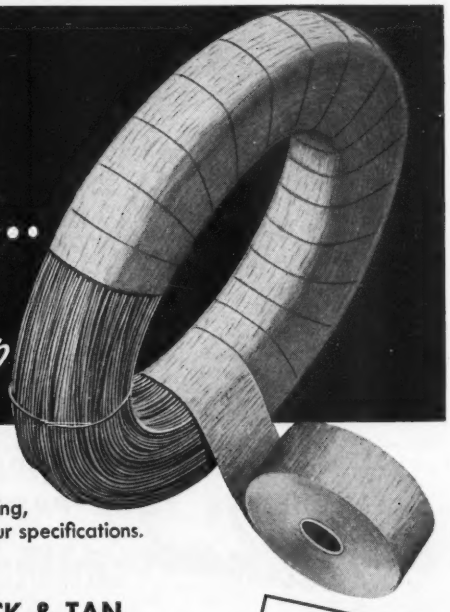
If you require a Vinyl compound rated higher than 105 degrees C for special applications, we suggest you communicate with us, as we may have a compound to meet your requirements.

Your inquiries are invited.

ELECTRONIC RUBBER COMPANY

69 Sunnyside Ave. • Stamford, Conn.

for TIGHTER *ALL-ROUND* PROTECTION... use NATCO *Spiral Wrap*



Strong, with a built-in stretch, NATCO's contour-hugging spiral wrap is superior for wire coils, tubing, metal rods and bars. Made to your specifications.

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- GREASEPROOF • REINFORCED
- ANY SIZE ROLL—*for machine or hand-wrapping*

Write today for sample rolls, prices and complete information.

NATIONAL WATERPROOF PAPERS, INC.

Manufacturers of Protective Papers, Liners and Bags Since 1903

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Larmuth power wrapping machines or special tension and edge-folding attachments for your machines.

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BARE ELECTRICAL TINSEL CONDUCTOR
for Telephone • Razor • Hearing Aid Cords

Silver Coated Copper Wire
Round for Kel-F & Teflon Insulated Radio and Instrument Hook-up Wire and UHF Cables.
Flat for Tinsel Ribbons and Tinsel Garlands.

NEVA-TARN—Metallic Yarns—Non Tarnish—
for knitted and woven fabrics. Est. 1871

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3 #C-3H SINFRA KNITTING MACHINES
COMPLETE - 40" TAKEUPS
1 NEW INDUSTRIAL OVEN - DUAL
HYDRAULIC TAKEUP STAND
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MACHINE - Pressure sensitive
All Machines Reconditioned in Our Own Shop

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THE BETTER YOUR WIRE . . .
THE BETTER YOUR PRODUCT!

Choose *Cortland* GALVANIZED WIRE

Fine products are made from fine-quality materials. That's why so many fabricators and formers select Cortland Brand specialized low carbon wires. Cortland Brand wires are among the finest available . . . made from the best corrosion-resisting, open-hearth steel in Wickwire's own mills. Use them for your products . . . in any of the following types, sizes and finishes.

SIZE: coils, spools or straightened cut to length.
FINISH: plain, galvanized, coppered or tinned.
TYPE: stone wire, bookbinder, flat, etc.

Cortland Brand

WICKWIRE BROTHERS, INC. CORTLAND, N.Y.

WB

Niles, Michigan, summarizes technical data on the company's 17-7 PH (precipitation-hardening) wire. The 17-7 alloy provides a corrosion-resistant chromium-nickel stainless spring wire with elastic properties similar to highest quality music wire and spring steels.

★ ★ ★

Another important advantage is the alloy's excellent dimensional stability when formed into springs and heat-treated, and when used at elevated temperatures.

★ ★ ★

The bulletin incorporates a tabular comparison of properties of springs made from 17-7 PH, Type 302 (18-8) and music wire derived from relaxation tests conducted at various temperatures and stress levels on helical compression springs. It shows the alloy's chemical composition, and lists the size ranges and coating in which National Standard is prepared to ship the spring tensile 17-7 PH.

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WIRE & WIRE PRODUCTS

453 Main St., Stamford, Conn.

Impressions of Scandanavia

(*Continued from page* 436)

plants in Paris.

★ ★ ★

To sum up the impressions of our group after six weeks in Scandanavia, we came away feeling that industrially those countries are very progressive and modern. They pay more attention to quality and cleanliness than many factories in the United States. Sweden was the only country visited that had not been invaded during World War II and was found to be more prosperous and further advanced in production.

The recovery from the loss of production and equipment in Norway, Denmark and Holland is remarkable and shows what hard-working self-reliant peoples they are. Both Norway and Holland are making rapid strides in industrial expansion and, if left undisturbed, will soon rival Sweden.

★ ★ ★

It was quite apparent that, in welfare and social relations, the manufacturers of Scandanavia are far ahead of the United States. Sweden in particular has worked out a satisfactory solution of the Employer-Employee relationship, resulting in a minimum of labor disputes since the inauguration of their present system.

★ ★ ★

We returned to the United States feeling that the objectives of our tour—understanding of the manufacturing techniques and labor conditions in Scandanavia—had been fulfilled in a most rewarding fashion.

MUSIC WIRE and SPECIAL WIRES

Music Wire for Industrial Purposes
211 sizes Bright Polished, .0015" to .3437"
45 sizes Bright Tinned, .003" to .125"
Aluminum—Annealed—Belt Lacing—Brass, Soft and Spring—Copper, Bare and Tinned
Coppered Steel Spring—Galvanized—Tinned
Monel—Nickel Silver—Pure Soft Nickel—Oil Tempered, Steel Spring, Black Finish
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Hoskins Chromel "A"—Stainless, Soft and Spring Temper—Tag Wire, 1000
in an Envelope—Florist Wire—Spooled and Coiled, 1/4-1/2-1-5#
Wires Straightened and Cut to length—Small Gauges—Small orders our specialty
Wires and Strands for the fishermen. Trolling Wires, Copper-Monel-Stainless.
Leader Wires, "Wilstabrite" Stainless and "Silverbrite" Music.

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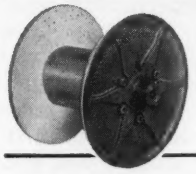
Save on replacement and maintenance!

RUGGED STEEL HEAVY DUTY PROCESSING REELS

RUGGED in design... DEPENDABLE in service!



Having trouble with light weight reels failing in heavy duty service? Send us a sketch or print stating the limiting dimensions and service required, we'll be glad to tell you about our facilities for supplying the wire rope and cable industry with special heavy duty processing reels, spools or bobbins. WRITE FOR BULLETIN 52-W.

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MILTON • PENNA.

LINÉ-GORCY
MECHANICAL
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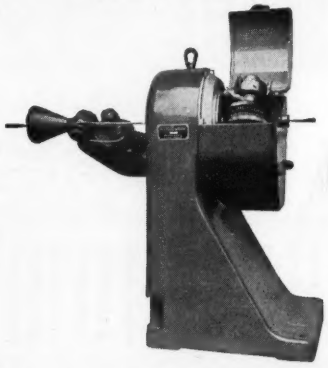

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Quality Control of Vinyl and Polyethylene Electrical Insulating and Jacketing Materials

(*Continued from page* 429)

as being controls on the raw materials are used again to recheck the same property in the finished material. Again, the decision as to which of these are to be rechecked and the frequency at which they are applied requires an integration of test precision, process variability, and risk.

★ ★ ★

For those of you interested in statistical methods, it can be stated that variables control charts are used wherever applicable. Statistical calculations are used to establish variability of testing methods and process and also to set up specification limits. Statistical design is used in experimentation almost exclusively. It should be emphasized though, that these statistical tools can be applied properly only if one uses common sense, sound engineering knowledge of the product and process, and good testing methods.

★ ★ ★

We have discussed two specific examples of how one can design and apply a quality control system to a given manufacturing process and product. It can be seen that one must have an intimate knowledge of all those variables associated with the product, the process, and raw materials, as well as definitive testing methods. A quality control system, if it is successful, operates, in the main, on raw materials and processing; thus assuring an acceptable product as it is being made and not after it is manufactured. A nominal degree of inspection or quality assurance testing is necessary on the finished product in order that the quality control system itself be maintained.

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ment of General Electric Company, Detroit, as supervisor of manufacturing methods and time standards.

★ ★ ★

Mr. Clements' previous General Electric Company assignments include supervising wage rates, manufacturing planning and methods at the Bowling Green, Ky., plant of the Air Conditioning Division, and the Utica, N. Y., plant of the Electronics Division.

New Aluminizing Process for Steel Wire

(*Continued from page* 421)

lium introduces serious problems in connection with its use. In continuous wire coating operations, major improvement in ductility and adherence of the coating is evident with silicon additions up to about 2.5%. Above this amount, no further significant benefits are evident.

★ ★ ★

Coating weight or thickness, smoothness or regularity, are controlled by the speed of travel of the wire during the continuous application of the coating. As the speed of travel increases, the weight of applied coating also increases and the coating becomes more irregular in thickness. At high speeds, the coating is characterized by variations in thickness which are probably caused by the flow characteristics of a relatively large volume of applied molten aluminum as well as vibration in the system. The heavier or thicker coatings, characterized by irregularity, show a greater tendency toward cracking and peeling than do the thinner smoother coatings.

★ ★ ★

While control of coating ductility and adherence is exercised by the reduction of the hardness and thickness of the alloy layer, for optimum coating characteristics the outermost layer should consist of a fine-grained matrix of alumi-

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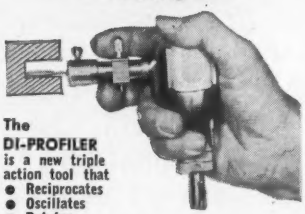

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num or aluminum alloy, similar in composition to the molten bath, with the aluminum-silicon-iron or aluminum-iron compound well distributed as fine particles.

★ ★ ★

The size of the wire also exerts an influence on coating characteristics. For a given speed of wire travel, the larger the wire size the heavier or thicker and the more irregular may be the applied aluminum coating. In general, heavy or thick and relatively irregular aluminum coatings on the larger sizes of wire show a tendency toward brittleness.

★ ★ ★

Hot-dipped aluminum coatings applied by this aluminizing process are appraised for ductility and adherence by means of the Wrap Test in which the wire is wrapped around a mandrel whose diameter is multiples of that of the coated wire. The coating technology is adjusted so that insofar as possible all coatings will pass the One Diameter Wrap Test. However, under most conditions, the applied aluminum coating will meet wrap test requirements applicable to equivalent thicknesses of hot-dipped zinc.

★ ★ ★

Satisfactory hot-dipped aluminum coatings may be applied to wire of various sizes so as to comply with the requirements of Class A zinc coatings specified by the **American Society for Testing Materials.** This comparison is made on the basis of equivalent thicknesses of zinc and aluminum coatings rather than equivalent weights of coating by reason of the fact that aluminum is lower in specific gravity than zinc. Aluminum coatings equivalent in thickness to coatings of zinc of about 1.25 to 1.5 ounces per square foot of uncoated wire surface have been successfully applied to sizes of wire .135" and larger, the coating being characterized by satisfactory ductility and adherence.

★ ★ ★

In general, the coating and properties of wire for standard galvanized products such as strand, chain link fabric, some grades of telephone and telegraph wire,

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most manufacturers' wires, and special products may be duplicated with aluminum-coated wire. In this connection, comparison of aluminum versus zinc coatings is made on the basis of equivalent coating thickness rather than equivalent weight. Most drawn galvanized wire and wire products may be duplicated with drawn aluminum-coated products.

★ ★ ★

Outdoor exposure tests in both industrial and highly humid atmospheres have not progressed to the point where the magnitude of the superiority in corrosion resistance of aluminum-coated wire compared to zinc-coated wire may be presented. However, preliminary data indicate that aluminum coatings are substantially superior to equivalent thicknesses of zinc coatings exposed in industrial and highly humid atmospheres. Salt spray corrosion data show less pronounced differences.

★ ★ ★

Aluminum coatings on iron and steel wire offer resistance to heat oxidation at relatively high temperatures. Some investigators have reported resistance up to temperatures of 1000 to 1300°F while others have indicated that this resistance extends to as high as 1600°F. In any case, to develop heat or oxidation resistance, the coated wire must be subjected to a diffusion heat treatment which converts the outermost layer of relatively pure aluminum or aluminum alloy to the same constituent or compound as the alloy layer.

★ ★ ★

The characteristics of hot-dipped aluminum coatings applied to iron and steel wire are such that a safe prediction may be made that this metal coating will assume an important place in the family of protective metal coatings offering substantial and significant advantages in the extension of service life, corrosion and oxidation resistance, on an economical basis. Continued research and development with aluminum coating processes and applied coatings will assure the importance of the role to be played in every day commercial and domestic life.

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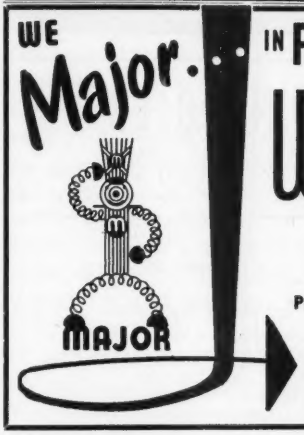

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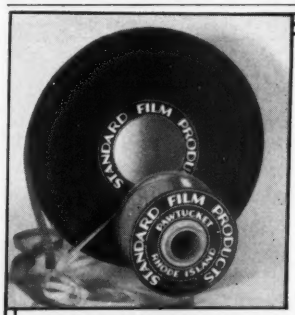

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Diamond Die Concern Under New Management

Detroit Wire Die Company, 3537 Leo Road, Fort Wayne, Ind., manufacturers of diamond wire drawing dies, has been purchased from **R. E. Connor,** by **Amos Pumphrey** and **Mel Geshwell** and hereafter will operate under the name **Detroit Wire Die, Inc.**

★ ★ ★

Mr. Pumphrey was with Fort Wayne Wire Die, Inc., for eleven years in Sales and Service Engineering and prior to that was in charge of the wire mill die shop of the **Phelps Dodge Copper Products Co.** at Fort Wayne. He has had a total of 35 years experience in wire mill and wire die experience.

★ ★ ★

Mr. Geshwell was with **Essex Wire Company** for nine years and has been engaged in the manufacture and sale of wire dies for the last ten years.

★ ★ ★

Together they bring to Detroit Wire Die, Inc. over 50 years of valuable experience, gathered from die consuming and manufacturing branches of the wire industry that will be invaluable to their customers.

Norton Appoints Engineers

Two new abrasive engineers and a new field engineer have been appointed by **Norton Company** of Worcester, Mass. Territory changes for two other abrasive engineers were also announced.

★ ★ ★

Laurence G. Holfelder, has been assigned to the central Indiana territory. **James A. Coleman,** will cover the territory in the area of Kansas City, Mo., and **Raymond B. Goodale** has been appointed a field engineer at Norton's Chicago district office. All three are former members of the Sales Engineering department.

★ ★ ★

In the territory changes, **William A. Simonds** will now cover Northern Texas and **Paul B. Foxwell** has been shifted from Kansas City to cover southern Texas.

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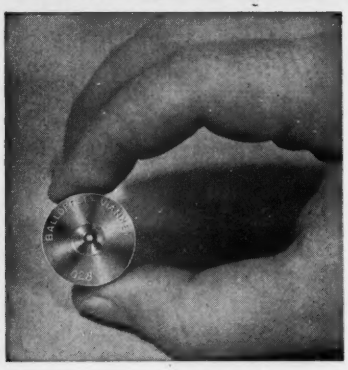

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Hot Dip Galvanizing Is A Science

(*Continued from page* 439)

reach the bath temperature, so only 71 pounds of zinc were deposited. In the second group the submersion time was longer, 0.40 of a minute, but the submersion time is still not long enough to permit the base metal to reach the same temperature as the bath. The metal deposited is 74.5 pounds per 72 cans, a little higher. The third group of 72 cans were submersed 0.60 of a minute in the galvanizing bath, and the metal deposited is 84 pounds for 72 cans, a large increase in zinc deposited. At this time however, alloying action begins, and it is of scientific interest to note that the first increase in weight was 3.5 pounds, and the second increase in weight was 9.5 pounds, whereas the zinc deposited at 0.80 of a minute submersion time is only 84.5 pounds, an increase in weight of only a half a pound. The same thing is shown at a submersion time of 1.00 minute with a zinc deposit of only 85 pounds for 72 cans, and an increase again of only one half a pound of zinc. It is very obvious therefore that a submersion time in the zinc up to 0.60 of a minute greatly increases the amount of zinc deposited as galvanized coating, and that a submersion time over 0.60 of a minute, the weight of zinc increase is very, very much slower. The alloying action is seen to start at a submersion time of 0.60 of a minute, so that it is entirely a question of highest quality for any weight of coating obtained with less than 0.60 of a minute submersion time. The increase of 14 pounds of zinc on the same number cans, by merely increasing the submersion time in the molten zinc from 0.20 of minute to 1.00 minute submersion time in the bath, conclusively proves that it is a definite scientific principle, "that the longer the submersion time in the zinc bath, the heavier the zinc will be deposited as galvanized coating." The quality test will determine how much over 0.20 of a minute the submersion time should be to obtain the lightest zinc deposit consistent with

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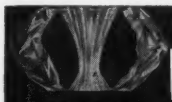

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★ ★ ★

In a previous article illustrating the principle, that, "the heavier the gage of the base metal, the heavier the zinc will be deposited as galvanized coating," another principle that we are now discussing, "the longer the submersion time, the heavier the zinc will be deposited as galvanized coating" was also clearly proven. In this laboratory test, 24, 26, 28, 29, and 30 gage base metals were used, and the submersion times started at 10 seconds, and went up to 120 seconds, at 10 second intervals. Practically no mention was made of the submersion times, since the material was to illustrate "that the heavier the gage of the base metal, the heavier the zinc is deposited as galvanized coating." At this time therefore the emphasis will be placed upon the submersion time, and the gage of the metal will be in the minor role.

★ ★ ★

We have set out to show and prove conclusively the principle, that "the longer the submersion time, the heavier the zinc will be deposited as galvanized coating." The confusion and complications of always having to deal with two, three, four, or five variables at once are here illustrated with two variables; the gage of the base metal and the submersion time. The results obtained from these tests clearly illustrate both principles. By studying the figures in TABLE III, and reading vertical down the weights increase with increase in submersion time. In these tests we have two variables, the change of gage of sheets, which is equivalent to an increase in the thickness of the sheets, and we also have the increase of the submersion time from 10 seconds to 120 seconds. By carefully

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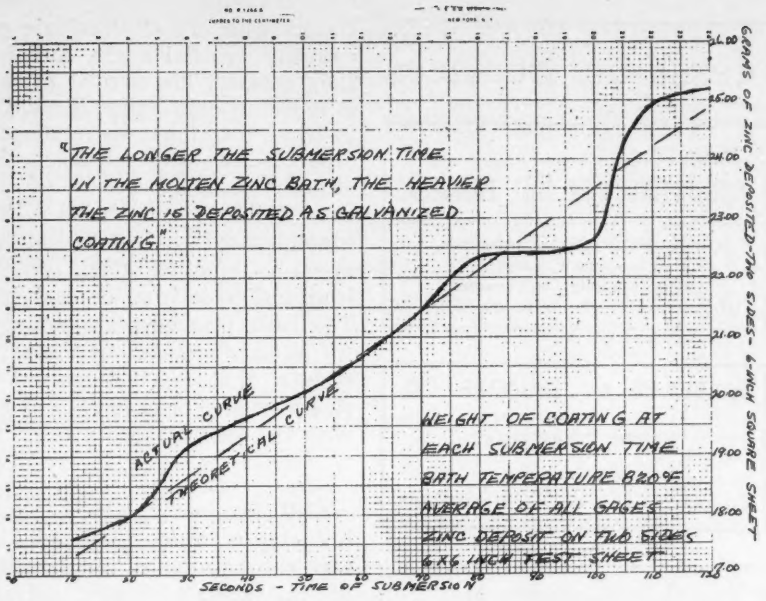
"THE LONGER THE SUBMERSION TIME IN THE MOLTEN ZINC BATH, THE HEAVIER THE ZINC IS DEPOSITED AS GALVANIZED COATING"
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WEIGHT OF COATING AT EACH SUBMERSION TIME BATH TEMPERATURE 820°F AVERAGE OF ALL GAGES ZINC DEPOSIT ON TWO SIDES 6 X 6 INCH TEST SHEET
SECONDS - TIME OF SUBMERSION
GRAMS OF ZINC DEPOSITED-TWO SIDES-6-INCH SQUARE SHEET

TABLE 111
AVERAGE ZINC DEPOSIT

Seconds Submersion Time	GAGE OF BASE METAL 24	26	28	29	30	Average
10	17.40	17.31	17.82	17.40	18.05	17.60
20	17.90	17.90	17.38	17.33	18.95	18.01
30	20.55	18.95	18.85	18.83	19.25	19.29
40	22.60	19.82	18.98	18.27	18.75	19.68
50	22.35	20.43	19.18	20.13	18.30	20.09
60	22.60	21.00	19.95	19.50	20.55	20.72
70	24.25	22.15	20.92	20.00	20.50	21.51
80	23.95	28.88	21.40	21.25	20.50	22.35
90	26.20	22.90	23.43	19.40	20.20	22.42
100	26.28	22.38	23.30	19.95	21.45	22.66
110	29.80	25.04	22.17	25.20	22.60	24.96
120	28.65	26.03	23.33	25.55	23.30	25.20
Average	23.73	21.91	20.61	20.24	20.10	

examining the figures for any separate gage however, we can eliminate one variable, the gage variable, and we see clearly that it is a general principle with every gage separately, that "the longer the submersion time in the molten zinc bath, the heavier the zinc is deposited as galvanized coating."

★ ★ ★

The basic principles of galvanizing which have been illustrated and proven by tests, both in the laboratory, and in ordinary routine plant practice, apply equally well to the hot dip galvanizing of all kinds and sizes of wire, and wire fabricated articles, such as wire fence. Actual figure values may not be true because of artificial interference with the operation of the principles, such as the use of wipes in wire galvanizing, and rolls in sheet galvanizing. If the underlying principles are known, then costs can be greatly reduced by setting up the operating conditions in accordance with the way the principles operate.

★ ★ ★

The purpose here is to first show

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clearly what all of the basic galvanizing principles are, and how they operate. The second purpose is to call attention that in addition to these principles, there are also other factors and variables that directly affect the results of each one of the basic principles. The example cited was the kind of base metal — whether steel, wrought iron, malleable iron, or cast iron. The basic principles are the same for all base metals, but the actual results, that is, the amount of zinc deposited as coating, will vary with the kind of base metal.

★ ★ ★

Still another factor of great importance, which may badly distort the results, is the condition of the surface. Badly corroded surfaces require a longer pickling time, and a longer pickling time means a heavier deposit of zinc as galvanized coating. The best method for obtaining the most reliable results is to set up a standard for each kind of article.

Celanese Appoints Three Men To New Posts

Continued growth of the Chemical Division of **Celanese Corporation of America** and plans for future expansion have necessitated a reorganization of the Product Development Department, of which **David D. Hecht** is Manager. As a consequence, three operating groups—Sales Development, New Chemical Development and Market Research—have been established within the Department.

★ ★ ★

Robert J. Davis has been named Supervisor of the Sales Development Group; **Howard L. Pilat** Supervisor of the New Chemical Development Group and **Winthrop M. Barnes** Supervisor of Market Research.

★ ★ ★

In addition special projects of the Department will be established as the need develops. The first of these groups to be launched is in Functional Fluids, for which **Howard G. Zbornik** is Project Leader.

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Union Wire Die Corp., New York, N. Y.

DIES—Swaging

Sjogren Tool and Mach. Co., Inc., Auburn, Mass.

DIES—Tube Drawing

Balloffet-Vianney Wire Die Co., Inc., Guttenberg, N. J.
Carboloy Dept. of General Electric Co., Detroit.
Eastern Carbide Corp., New Rochelle, N. Y.
Firth Sterling, Inc., Pittsburgh, Pa.
Hontan Corporation, Yonkers, N. Y.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelloy Corporation, New York, N. Y.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, O.
Rusch Wire Die Corp., Croton-on-Hudson, N. Y.
Vascoloy-Ramet Corp., Waukegan, Ill.
Willey's Carbide Tool Co., Detroit, Michigan.

DRAW BENCHES—

(See MACHINERY—Draw Benches)

DRUMS—Wire Packaging

Continental Can Company, Van Wert, Ohio

DRUMS & TRAVERSES—For Cable Reels

Entwistle, James L., Co., Providence, R. I.
Hubbard Spool Co., Garrett, Ind.
New York Engineering Co., Yonkers, N. Y.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio

DRYING EQUIPMENT

Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio.
Michigan Ovens, Inc., Detroit, Michigan.
Rockwell, W. S. Co., Fairfield, Conn.

ENGINEERS—Consulting

Lubricants—Hans C. Bick, Inc., Reading, Pa.
Wire Mill—Clarence S. Arms, Worcester, Mass.
Zinc—Imhoff, Wallace G. Co., Los Angeles, Calif.

EYELETS—Brass or Zinc

Platt Bros. & Co., The, Waterbury, Conn.

FENCING & FENCES—Wire

Interlocking Fence Co., Morton, Ill.

FILM—Insulating

Standard Film Products Corp., Pawtucket, R. I.

FOAM PRODUCING COMPOUNDS—

American Chemical Paint Co., Ambler, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

FURNACES—Brazing

Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Galvanizing Equipment

Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Heat Treating

Ajax Electric Co., Inc., Philadelphia, Pa.
Carl Mayer Corp., The, Cleveland, Ohio
Electric Furnace Co., Salem, Ohio
Drever Company, Phila., Pa.
Rockwell, W. S., Co., Fairfield, Conn.
Wilson, Lee, Engr. Co., Cleveland, Ohio

FURNACES—Lead Melting

Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

FURNACES—Pot (oil, gas, electric)

Ajax Electric Co., Inc., Philadelphia, Pa.

FURNACES—Resistance Heating, Strand

(See Annealing Machines)

FURNACES—Salt Bath

Ajax Electric Co., Inc., Philadelphia, Pa.
Electric Furnace Co., Salem, Ohio
Rockwell, W. S. Co., Fairfield, Conn.

GALVANIZING EQUIPMENT — (See MACHINERY—Galvanizing Wire)

GRINDERS—Roll

Norton Co., The, Worchester, Mass.

GUIDES—For Wire

Heany Industrial Ceramic Corp., New Haven, Conn.
Lignum-Viate Products Company, Jersey City, N. J.

GUIDE TIPS—For Extruding Machines (See NOZZLES)

HAMMERS—Nail Heading

Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

HAMMERS—Swaging

Sjogren Tool and Machine Co., Auburn, Mass.

HARDSURFACING ALLOYS—

(See Alloys—Hardsurfacing)

HOOKS—Pickling & Liming

Youngstown Welding & Eng'g' Co., Youngstown, Ohio

HOISTS—Electric Travelling

Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio

INHIBITORS—Pickling

American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Parkin Chemical Co., The, Pittsburgh, Pa.

INSULATING MATERIALS—

Carbro Chemical Company, Pawtucket, R. I.
Celanese Corporation of America, New York, N. Y.
Chemical Products Co., E. Providence, R. I.
Electronic Rubber Co., Stamford, Conn.
Heineman Corp., Oscar, Chicago, Illinois
Monsanto Chemical Co., St. Louis, Mo.
Naugatuck Chemical Div., U. S. Rubber Co., New York, N. Y.
Pittsburgh Plate Glass Company, Pittsburgh, Pa.
Plymouth Cordage Company, Plymouth, Mass.
Standard Film Products Corp., Pawtucket, R. I.
Synthetic Thread Corporation, Bethlehem, Pa.

INSULATING MATERIALS — Paper—For Electric Wire Cable

Plymouth Cordage Company, Plymouth, Mass.

LACQUERING SYSTEMS — See MACH.—Lacquering Electric Wire

LACQUERS—For Electric Wire

Chemical Products Co., E. Providence, R. I.

LAME—LAHN—

Montgomery Co., The, Windsor Locks, Conn.

LIME—

Warner Co., The, Philadelphia and Bellefonte, Pa.

LUBRICANTS — For Metal Cutting, Stamping and Drawing

Apex Alkali Products Co., Philadelphia, Pa.
Magnuson Products Corporation, Brooklyn, N. Y.
Miller, R. H., Co., Inc., Homer, N. Y.
Nopco Chemical Co., Harrison, N. J.
Standard Industrial Compounds Co., Chicago.

LUBRICANTS—Wire Drawing

(See Compounds—Wire Drawing)

LUBRICANTS—Wire Rope

Swift & Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire, Hose)

American Insulating Mach'y Co., Phila., Pa.
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J
Wire & Textile Mach'y, Inc., (used), Pawtucket, R. I.

MACHINERY—Barbed Wire

Glader Wm., Machine Works, Chicago, Ill.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Bobbin Winders

Mummert-Dixon Company, Hanover, Pa.
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Braiding

Fidelity Machine Co., Inc., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Wardwell Braiding Mach. Co., Central Falls, R. I.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bunching

Cook Manufacturing Co., The, Paterson, N. J.
Edmands Company, The, Providence, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Bundling, Scrap

Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Cable, Electric

American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Inc., Philadelphia, Pa.
Haskell-Dawes Machine Co. Philadelphia, Pa.
New England Butt Co., Providence, R. I.
New York Engineering Co., Yonkers, N. Y.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Capstans (See Machinery—Winding Wire)

MACHINERY—Centerless Grinding

Schumag Schumacher Metallwerke, Aachen, Germany.

MACHINERY—Chain Making

Nilson, A. H. Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Closing Rope

Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Coiling Rod

Vaughn Mach'y Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Cold Heading

Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Copper Wire Drawing

Aetna-Standard Engineering Co., Pittsburgh.
American Insulating Mach'y Co., Phila., Pa.
National Mach'y Exch. (Used), New York.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire (See MACHINERY—Insulating Wire)

MACHINERY—Crimping Wire

Cedar West Tool Co., New York, N. Y.

MACHINERY—Cutting

Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool, Inc., New Haven, Conn.
Wells, Frank L., Co., Kenosha, Wis.

MACHINERY—Diameter Testing Continuous

Standard Electronic Research, New York, New York.

MACHINERY—Descaling Rod, Dry

Fisher Associates, New York, N. Y.
Herborn, Herborn, Germany.

MACHINERY—Die Making

Boulin, Victor J., Inc., New York, N. Y.
Carboloy Dept. General Electric Co., Detroit, Mich.
Dykrex Corp., Roos Tool & Mfg. Div., Newark, N. J.
Firth Sterling, Inc., Pittsburgh, Pa.
Nord International Corporation, Orange, N. J.
Union Wire Die Corp., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Draw Benches
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging (See MACHINERY — Tandem Rolling and Edging Mills)

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Ovens, Inc., Detroit, Michigan
Rockwell Co., W. S., Fairfield, Conn.

MACHINERY—Extruding
Aetna-Standard Engineering Co., Pittsburgh.
Davis-Standard Sales Corp., Mystic, Conn.
Entwistle, James L., Company, Providence, R. I.
Modern Plastic Machinery Co., Lodi, N. J.
Royle, John, & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Fence
Blashill and Company, Arthur, Worcester, Mass.
Glader, Wm., Machine Works, Chicago, Ill.
Interlocking Fence Co., Morton, Ill.

MACHINERY—Flat Wire
Fenn Manufacturing Co., Newington, Conn.
Mettler Machine Tool, Inc., New Haven, Conn.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Forming Wire
Baird Machine Co., Stratford, Conn.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Fourdrinier Looms
Cedar West Tool Co., New York, N. Y.

MACHINERY—Galvanizing Wire
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio

MACHINERY—Gang Winders
Entwistle, Jas. L. Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., The, Worcester, Mass.

MACHINERY—Insulating Wire
Aetna-Standard Engineering Co., Pittsburgh, Pa.
American Insulating Mach'y Co., Phila., Pa.
Davis-Standard Sales Corp., Mystic, Conn.
Fidelity Machine Co., Inc., Philadelphia, Pa.
Michigan Ovens, Inc., Detroit, Michigan
Modern Plastic Machinery Company, Lodi, N. J.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Wardwell Braiding Mach. Co., Central Falls, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Inc., Philadelphia, Pa.

MACHINERY—Lacquering Electric Wire
American Insulating Mach'y Co., Philadelphia.
Cook Mfg. Co., The, Paterson, N. J.
Industrial Ovens, Inc., Cleveland, O.
Michigan Ovens, Inc., Detroit, Michigan

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Looms, Wire Weaving
Cedar West Tool Co., New York, N. Y.
Interlocking Fence Co., Morton, Ill.
Mummert-Dixon Co., Hanover, Pa.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Material Handling
(See Material Handling Equipment)

MACHINERY—Measuring Wire & Cable
Davis Electric Company, Wallingford, Conn.
Durant Mfg. Co., Milwaukee, Wis.
Entwistle, James L., Company, Providence, R. I.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Nail and Tack
Baird Machine Co., The Stratford, Conn.
Glader, Wm., Machine Works, Chicago, Ill.
National Mach'y Exch. (Used), New York, N. Y.
Seybold Transworld Exporters, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany

MACHINERY—Packaging Wire
Coulter & McKenzie Machine Co., Bridgeport, Conn.

MACHINERY—Pickling
Chemsteel Construction Co., Pittsburgh, Pa.
Youngstown Welding & Eng'g Co., Youngstown, Ohio.

MACHINERY—Pin Making
Baird Machine Co., The, Stratford, Conn.

MACHINERY—Pointing
Aetna-Standard Engineering Co., Pittsburgh, Pa.
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used). New York.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Foundry & Machine Co., Waterbury Conn.

MACHINERY—Poultry Wire Fencing
Interlocking Fence Co., Morton, Ill.

MACHINERY—Pumps for Molten Metal
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Re-Spooling
Boyd & Sons Manufacturing Corp., Philadelphia, Pa.
Cedar West Tool Co., New York, N. Y.
Davis Electric Company, Wallingford, Conn.
Emory, Robert J., Co., Newark, N. J.
Mummert-Dixon Co., Hanover, Pa.
National Mach'y Exch. (Used), New York.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Rod Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Schumag Schumacher Metallwerke, Aachen, Germany

MACHINERY—Rolling Mill
Fenn Manufacturing Co., Newington, Conn.
Morgan Construction Co., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Rubber Insulating
Davis-Standard Sales Corp., Mystic, Conn.
Modern Plastic Machinery Co., Lodi, N. J.
Royle, John & Sons, Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Serving
Fidelity Machine Co., Phila., Pa.
Pourtier Pere et Fils, Romainville (Seine), France
Wardwell Braiding Machine Co., Central Falls, R. I.

MACHINERY—Spark Testing
Davis Electric Company, Wallingford, Conn.
Entwistle, James L., Company, Providence, R. I.
Modern Plastic Machinery Co., Lodi, N. J.
Peschel Electronics, Inc., New Rochelle, N. Y.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Spring Making
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt., Germany
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Spring Testing
Emmericher Maschinenfabrik, Emmerich, Germany

MACHINERY—Staple
Seybold Transworld Exporters, New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Wafios, Maschinenfabrik, Reutlingen 3, Wurtt, Germany.

MACHINERY—Straightening & Cutting
Continental Fdy & Machine Co., Medart Division, Pittsburgh, Pa.
Lewis Machine Co., The, Cleveland, Ohio
Mettler Machine Tool Co., New Haven, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Wells, Frank L., Co., Kenosha, Wisc.

MACHINERY—Stranding
Haskell-Dawes Machine Co., Philadelphia, Pa.
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Swaging
Fenn Manufacturing Co., Newington, Conn.
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Take-Up and Pay-Out
Aetna-Standard Engineering Co., Pittsburgh, Pa.
American Insulating Mach'y Co., Phila., Pa.
Blashill and Company, Arthur, Worcester, Mass.
Davis Electric Company, Wallingford, Conn.
Davis-Standard Sales Corp., Mystic, Conn.
Entwistle, James L., Company, Providence, R. I.
Fenn Manufacturing Co., Newington, Conn.
Industrial Ovens, Inc., Cleveland, Ohio
Modern Plastic Machinery Co., Lodi, N. J.
New York Engineering Co., Yonkers, N. Y.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.
Wire Equipment Mfg. Co., Trenton, N. J.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Pourtier Pere et Fils, Romainville (Seine), France
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

MACHINERY—Testing Magnet Wire Coatings for Pin Holes
Peschel Electronics, Inc., New Rochelle, N. Y.

MACHINERY—Testing, Physical
Emmericher Maschinenfabrik, Emmerich, Germany
Scott Testers, Inc., Providence, R. I.

MACHINERY—Tinning Wire
American Insulating Mach'y Co., Phila., Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill, Cold Drawing
Aetna-Standard Engineering Co., Pittsburgh, Pa.
Mettler Machine Tool, Inc., New Haven, Conn.

MACHINERY—Turks Head
Fenn Manufacturing Co., Newington, Conn.

MACHINERY—Twinning
(See Mach.—Bunching)

MACHINERY—Twisters, Wire
Cook Manufacturing Co., The, Paterson, N. J.
Davis Electric Company, Wallingford, Conn.
Edmands Company, The, Providence, R. I.
Haskell-Dawes Machine Co., Philadelphia, Pa.

MACHINERY—Used
National Machinery Exchange, New York, N. Y.
Wire & Textile Machy., Inc., Pawtucket, R. I.

MACHINERY—for Wire Welding
(See WELDERS—Butt and Spot)

MACHINERY—Welded Wire Fabric
Maschinen & Stahl, A. G.,
Entwicklungs Verwertungs Gessellschaft Switzerland

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

MACHINERY—Winding Wire
Cedar West Tool Co., New York, N. Y.
Emory, Robert J., Newark, N. J.
Entwistle, James L., Company, Providence, R. I.
Fenn Manufacturing Co., Newington, Conn.
Mummert-Dixon Co., Hanover, Pa.
New England Butt Co., Providence, R. I.
Standard Mill Supply Co., Pawtucket, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Drawing
Aetna-Standard Engineering Co., Pittsburgh, Pa.
Cook Manufacturing Co., The, Paterson, N. J.
Coulter & McKenzie Machine Co., Bridgeport, Conn.
Fenn Manufacturing Co., Newington, Conn.
Herborn, Herborn, Germany
Morgan Construction Co., Worcester, Mass.
National Mach'y Exch. (Used), New York, N. Y.
Schumag Schumacher Metallwerke, Aachen, Germany
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, Ohio
Waterbury-Farrel Foundry & Machine Co., Waterbury, Conn.

MACHINERY—Wire Forming
Baird Machine Co., The, Stratford, Conn.
National Mach'y Exch. (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Wire Rope
Milton Machine Works, Inc., Milton, Pa.
New England Butt Co., Providence, R. I.
Niehaus, K. A., Maschinenfabrik, Dusseldorf-Rath, Germany
Watson Machine Co., Paterson, N. J.

MACHINERY—Wrapping with Paper
Terkelsen Machine Co., Boston, Mass.

MATERIAL HANDLING EQUIPMENT—
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., Wickliffe, O.

NAIL TOOLING—Tungsten Carbide
Firth Sterling, Inc., Pittsburgh, Pa.
Pittsburgh Carbide Die Co., Monongahela, Pa.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Brothers, Inc., Cortland, N. Y.

NOZZLES—For Extruding Machines
Wire Tool Div., Bridgeport Jig Boring Co., Bridgeport, Conn.

OVENS—Cable Lacquering and Enameling
American Insulating Mach'y Co., Phila, Pa.
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio
Michigan Ovens, Inc., Detroit, Michigan
Rockwell Co., W. S., Fairfield, Conn.

OVENS—Rod Bakers
Carl-Mayer Corp., The, Cleveland, Ohio

OVENS—Welding Rod Coating
Carl-Mayer Corp., The, Cleveland, Ohio
Industrial Ovens, Inc., Cleveland, Ohio

PAINT BONDING CHEMICALS—
American Chemical Paint Co., Ambler, Pa.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAPER—Creped Wrapping
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—For Coil Wrapping and Corrosion Prevention
Arkell Safety Bag Company, New York, N. Y.
National Waterproof Papers, Inc., Beverly, N. J.
Terkelsen Machine Co., Boston, Mass.

PAPER—Insulating
Plymouth Cordage Co., Plymouth, Mass.

PATENT ATTORNEYS—
Lancaster, Allwine & Rommel, Washington, D. C.

PAY-OUT SYSTEMS—
(See MACHINERY—Take-Up & Pay-Out)

PHOSPHATE COATING CHEMICALS
(See COMPOUNDS—Phosphate Coating)

PICKLING COMPOUNDS—
See (Inhibitors—Pickling)

PICKLING—Hooks, etc. Acid Resisting
Youngstown Welding & Eng'g Co., Youngstown, Ohio

PICKLING TANK LININGS—
Chemsteel Construction Co., Pittsburgh, Pa.
Haveg Corp., Newark, Del.

PIPES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

PLASTICS—for Wire Insulation
Electronic Rubber Co., Stamford, Conn.
Monsanto Chemical Co., St. Louis, Mo.
Naugatuck Chemical Div., U. S. Rubber Co., New York, N. Y.

POTS—Lacquer
Industrial Ovens, Inc., Cleveland, Ohio

PRESSES—Hydraulic and Mechanical
Aetna-Standard Engineering Co., Pittsburgh, Pa.

PULLERS AND GRIPS—For Wire
Morgan Construction Co., Worcester, Mass.
Scudder, E. J. Fdry. & Mach. Co., Trenton, N. J.
Sjogren Tool and Machine Co., Auburn, Mass.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, Ohio

PUMPS—Molten Metal
Fisher Associates, New York, N. Y.

REEL AND TENSION STANDS—
Davis Electric Company, Wallingford, Conn.
Fidelity Machine Company, Inc., Philadelphia
Industrial Ovens, Inc., Cleveland, Ohio.
New York Engineering Co., Yonkers, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Mill Supply Co., Pawtucket, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS & SPOOLS—Aluminum Alloy
Acrometal Products, Inc., Minneapolis, Minn.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Annealing and Stranding
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Garrett, Ind.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio

REELS—Metal Bound
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., Wm., Westport, Mass.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS—Plywood
Hubbard Spool Co., Garrett, Ind.
McCaskie, Inc., Wm., Westport, Mass.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REELS & SPOOLS—Steel (All Types)
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Clark, J. L. Mfg. Co., Rockford, Ill.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., Yonkers, N. Y.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS—Wire Mill
Acrometal Products, Inc., Minneapolis, Minn.
American Pulley Co., Philadelphia, Pa.
Apco Mossberg Co., Attleboro, Mass.
Bridge Mfg. Co., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Mason Can Company, East Providence, R. I.
McCaskie, Inc., Wm., Westport, Mass.
Mettler Machine Tool, Inc., New Haven, Conn.
Milton Machine Works, Inc., Milton, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New York Engineering Co., Yonkers, N. Y.
Republic Steel Corp., Pressed Steel Div., Niles, Ohio
Wardwell Braiding Machine Co., Central Falls, R. I.

REELS & SPOOLS—Wooden
American Woodworking Co., Chicago, Ill.
Bridge Mfg. Co., Inc., The, Hazardville, Conn.
Durkee Mfg. Co., Pine River, Minn.
Hubbard Spool Co., Garrett, Ind.
Nelson Company, The, Baltimore, Md.
Strand-Buffalo Corporation, North Tonawanda, N. Y.

REFRACTORIES—High Temperature
Norton Company, Worcester, Mass.

ROD BAKERS—
(See OVENS—Rod Bakers)

RODS—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio
Crucible Steel Co. of America, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.

RODS—Steel
Crucible Steel Co. of America, Pittsburgh, Pa.

RODS—Wire—Non-Ferrous
Chase Brass & Copper Co., Waterbury, Conn.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Platt Bros. & Co., The, Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Titan Metal Manufacturing Co., Bellefonte, Pa.

RODS—Wire, Steel
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Sheffield Steel Corp., Kansas City, Mo.
Youngstown Sheet & Tube Co., Youngstown, O.

ROLLS—Wire Straightening
Lignum-Vitae Products Corp., Jersey City, N. J.

ROPE—Blocks
Madesco Tackle Block Co., Easton, Pa.

ROPE—Wire
American Steel & Wire Company, Cleveland, O.
Bethlehem Steel Co., Bethlehem, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.

RUST PROOF COMPOUNDS—
(See COMPOUNDS—Rust Preventing)

RUST REMOVING COMPOUNDS—
(See COMPOUNDS—Rust Preventing)

SATURANTS—Cable
Carbro Chemical Company, Pawtucket, R. I.

SATURATION SYSTEMS—
Industrial Ovens, Inc., Cleveland, Ohio
New York Engineering Co., Yonkers, N. Y.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

SHEAVES—Wood
Lignum-Vitae Products Corp., Jersey City, N. J.

SOAPS—Industrial and Wire Drawing
(See COMPOUNDS—Wire Drawing)

SPOOLS—(See Reels & Spools)

SPOOLS—Stamped Metal for Retail Wire Sales
Clark, J. L. Mfg. Co., Rockford, Ill.
Mason Can Co., East Providence, R. I.

STAMPINGS—Steel
Acrometal Products, Inc., Minneapolis, Minn.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Roebling's, John A. Sons Corp., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, O.

WHERE TO BUY, Continued

For more complete information, consult the annual Wire and Wire Products Buyers' Guide.

TANKS—Compound
National Annealing Box Co., Washington, Pa.
New York Engineering Co., Yonkers, N. Y.
Watson Machine Co., Paterson, N. J.

TANKS—Pickling and Plating
Chemsteel Construction Co., Pittsburgh, Pa.
National Annealing Box Co., Washington, Pa.

TESTERS — INSULATION
(See MACHINERY—Spark Testers)

TESTING EQUIPMENT
(See MACHINERY Testing, Physical and Diameter Testing)

TINNING PROCESS—
Metal & Thermit Corp., New York, N. Y.

TINSEL—Electric Conductor
Montgomery Co., The, Windsor Locks, Conn.

TINSEL WIRE—Resistance, Lame, Decorative Cords Thread—Bare Copper, Silver and False Gold Coated, etc.
(See TINSEL—Electric Conductor)

TOOLS—Die Cutting and Finishing
Nord International Corporation, Orange, N. J.

TOOLS—Nail Machine
Pittsburgh Carbide Die Co., Monongahela, Pa.
Wire Equipment Mfg. Co., Trenton, N. J.

TOOLS—Wire Cutting
Porter, H. K. Inc., Somerville, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

TRANSMISSIONS—Variable speed (See Machy—Power Transmission)

TRAVERSES & DRUMS—For Reels
(See Drums & Traverses)

TRAVERSE MECHANISMS—
Apco Mossberg Co., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.
Wire & Textile Mach'y, Inc. (used) Pawtucket, R. I.

VALVES & FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VARNISHES & LACQUERS—for Electric Wire
Carbro Chemical Co., Pawtucket, R. I.
Chemical Products Co., E. Providence, R. I.

VULCANIZING PANS AND EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Maschinen & Stahl., A. G., Entwicklungs Verwertungs Gesellschaft Switzerland
Micro Products Co., Chicago, Ill.

WIRE—Aluminum
Elmet Division, North American Philips Company, Inc., Lewiston, Maine
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Malin & Co., The, Cleveland, Ohio
National Standard Company, Niles, Mich.
Scovill Mfg. Co., Waterbury, Conn.

WIRE—Barbed
Interlocking Fence Co., Morton, Ill.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.

WIRE—Brass
Chase Brass & Copper Co., Waterbury, Conn.
Scovill Mfg. Co., Waterbury, Conn.
Spencer Wire Corp., Union, N. J.
Titan Metal Manufacturing Co., Bellefonte, Pa.

WIRE—Brush
Spencer Wire Corp., Union, N. J.

WIRE—Bunched & Stranded, Copper
Camden Wire Co., Camden, N. Y.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Cold Heading
American Steel & Wire Co., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Camden Wire Co., Camden, N. Y.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
Pittsburgh Steel Co., Pittsburgh, Pa.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Titan Metal Manufacturing Co., Bellefonte, Pa.
Wickwire Steel Div., The Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Copper
Chase Brass & Copper Co., Waterbury, Conn.
Spencer Wire Corp., Union, N. J.

WIRE—For Electrical Conductors
Camden Wire Co., Camden, N. Y.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.

WIRE—Flat, Fine
Elmet Division, North American Philips Company, Inc., Lewiston, Maine
Montgomery Co., The, Windsor Locks, Conn.

WIRE—Galvanized
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
National Standard Company, Niles, Mich.
Roebling's, John A. Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Manufacturers
American Steel & Wire Co., Cleveland, Ohio
Bethlehem Steel Co., Bethlehem, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Kaiser Aluminum & Chemical Corp., Oakland, Calif.
Keystone Steel & Wire Co., Peoria, Ill.
National Lock Washer Company, The, Newark, N. J.
North American Philips Co., Inc., Elmet Division, Lewiston, Me.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Scovill Mfg. Co., Waterbury, Conn.
Sheffield Steel Corp., Kansas City, Mo.
Spencer Wire Corp., Union, N. J.
Titan Metal Manufacturing Co., Bellefonte, Pa.
U. S. Steel Corp., N. Y., N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Music
American Steel & Wire Co., Cleveland, Ohio
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Malin & Co., The, Cleveland, Ohio
Spencer Wire Corp., Union, N. J.

WIRE—Needle
Carpenter Steel Company, Webb Wire Division, New Brunswick, N. J.

WIRE—Nickel Silver and Phosphor Bronze
Alloy Metal Wire Div., H. K. Porter Co., Inc., Pittsburgh, Pa.
Chase Brass & Copper Co., Waterbury, Conn.
Malin & Co., The, Cleveland, Ohio
Titan Metal Manufacturing Co., Bellefonte, Pa.

WIRE—Oil Tempered
Crucible Steel Co. of America, Pittsburgh, Pa.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.

WIRE—Silver Plated Copper
Camden Wire Co., Camden, N. Y.

WIRE—Special Shapes
Alloy Metal Wire Div., H. K. Porter Co., Inc., Pittsburgh, Pa.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
National Lock Washer Company, The, Newark, N. J.
Titan Metal Manufacturing Co., Bellefonte, Pa.

WIRE—Spring
Alloy Metal Wire Div., H. K. Porter Co., Inc., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Stainless Steel
American Steel & Wire Co., Cleveland, Ohio
Carpenter Steel Company, Webb Wire Div., New Brunswick, N. J.
Crucible Steel Co. of America, Pittsburgh, Pa.
Firth Sterling, Inc., Pittsburgh, Pa.
Major Co., J., Chicago, Ill.
National Lock Washer Company, The, Newark, N. J.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.

WIRE—Steel—Also Coppered and Galvanized Steel
Alloy Metal Wire Div., H. K. Porter Co., Inc., Pittsburgh, Pa.
Bethlehem Steel Co., Bethlehem, Pa.
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Continental Steel Corp., Kokomo, Ind.
Crucible Steel Co. of America, Pittsburgh, Pa.
Johnson Steel & Wire Co., Inc., Worcester, Mass.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Major Co., J., Chicago, Ill.
National Standard Company, Niles, Mich.
Pittsburgh Steel Co., Pittsburgh, Pa.
Roebling's, John A., Sons Corp., Trenton, N. J.
Sheffield Steel Corp., Kansas City, Mo.
Spencer Wire Corp., Union, N. J.
U. S. Steel Export Co., New York, N. Y.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, O.

WIRE—Straightening and Cutting
Colorado Fuel and Iron Corporation, Pacific Coast Division, Oakland, Calif.
Jones & Laughlin Steel Corporation, Pittsburgh, Pa.
Major Co., J., Chicago, Ill.
Wickwire Brothers, Inc., Cortland, N. Y.
Wickwire Steel Div., Colorado Fuel & Iron Corp., New York, N. Y.

WIRE—Tinned Copper
Camden Wire Co., Camden, N. Y.

WIRE—Tungsten
North American Philips Co., Inc., Elmet Division, Lewiston, Me.

WIRE—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WOOD—for Guide, Rolls, Bushings, Wear Parts, etc.
Lignum-Vitae Products Corp., Jersey City, N. J.

WRAPPING PAPER—Creped
(See PAPER—Creped Wrapping)

YARNS & TAPES—Insulating
Celanese Corporation of America, New York, N. Y.
Heineman Corp., Oscar, Chicago, Illinois
Pittsburgh Plate Glass Company, Pittsburgh, Pa.
Standard Film Products Corp., Pawtucket, R. I.
Synthetic Thread Corporation, Bethlehem, Pa.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

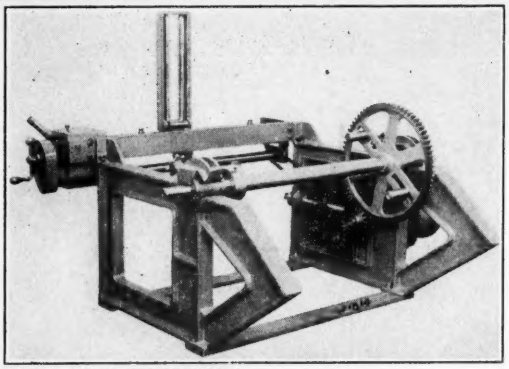
PATERSON 3, NEW JERSEY, U. S. A.

ELECTRICAL WIRE AND CABLE, WIRE ROPE, CORDAGE
AND MASTICATING MACHINERY MANUFACTURERS

WATSON

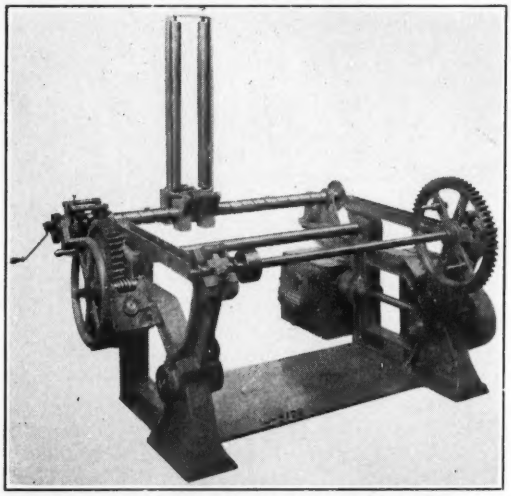
HEAVY DUTY TAKEUPS

AVAILABLE EITHER SEPARATELY OR WITH OUR EQUIPMENT, IN A VARIETY OF DESIGNS OF WHICH A FEW ARE SHOWN HERE.



TYPE "H" SHAFTLESS

No. W-3652 FOR 24" to 50" DIA. REELS, 3 TON CAPACITY WITH D/40 TRANSMISSION AND TRAVERSE "RR". MODERATELY PRICED UNIT AVAILABLE IN TWO SIZES WITH HYDRAULIC LIFT, DRIVE ALWAYS IN MESH DESIGN, PROVIDING SAFE, RAPID MANIPULATION WITH ANY SIZE REEL WITHIN RANGE.



TYPE "V" SHAFTLESS, FULLY MOTORIZED

No. W-3050a FOR 72" DIA. 6 TON REELS WITH D/100 TRANSMISSION AND TRAVERSE "WR". DESIGN PROVIDES FOR SAFE RAPID REEL CHANGES. SIX AVAILABLE SIZES WILL LIFT FROM 36" TO 120" DIA. REELS DIRECTLY FROM FLOOR. THE SMALLEST HAS 6 TON, THE LARGEST 30 TON CAPACITY.

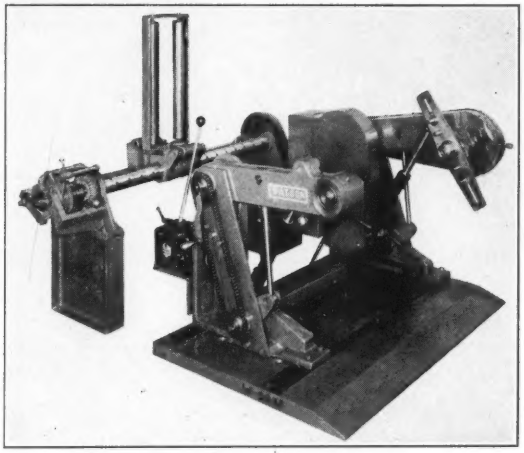
ALL UNITS ALSO AVAILABLE IN FOOT TREADLE, FOOT SWITCH OR HYDRAULIC FLOAT CONTROL MODELS.

★ ★ ★ ★ ★

Machine Bulletins Upon Request

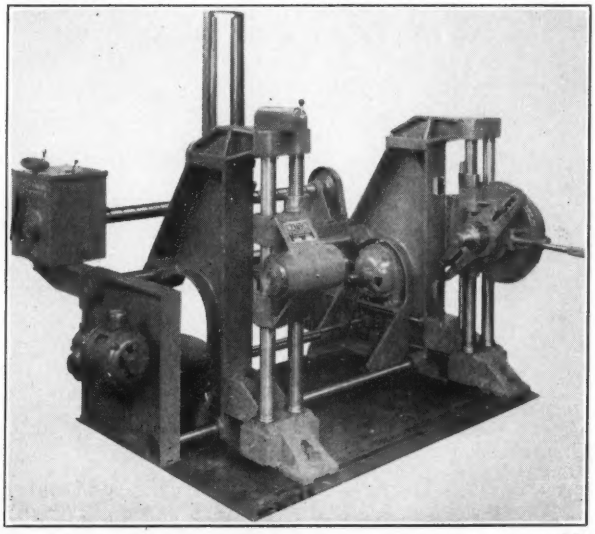
TYPE "I" INCLINE FRAME

No. W-1814 FOR 48" DIA. 2 TON REELS WITH MULTIPLE DISC SLIP FRICTION AND TRAVERSE "CR". HEAVY CONSTRUCTION AND FLEXIBILITY ALLOWS ADAPTION TO EXISTING EQUIPMENT. CYLINDER SWING REEL LOCK FACILITATES RAPID REEL LOADING AND UNLOADING. OFFERED IN FOUR SIZES.



TYPE "W" MECHANICAL LIFT

No. W-3126 FOR 60" DIA. 4 TON REELS WITH D/40 TRANSMISSION AND TRAVERSE "RR". POWERFUL, FREE-ACTING HANDWHEEL MECHANIZED UNIT. SIX SIZES PROVIDE FOR FLOOR PICK-UP OF REELS FROM 14" to 84" DIA. AND FROM 1 TO 6 TON CAPACITY.



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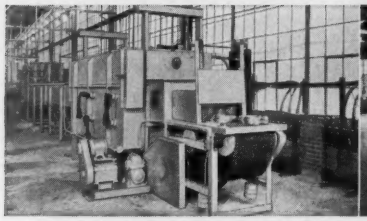
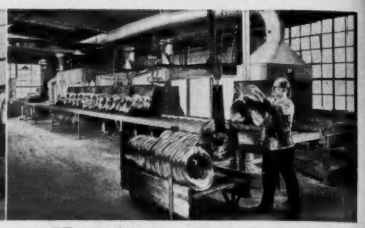


EF belt conveyor furnace bright annealing coiled alloy steel and non-ferrous wire.

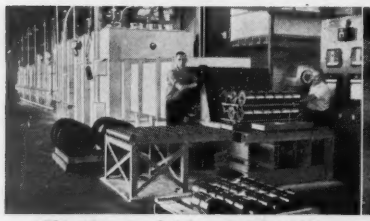


EF continuous roller rail pusher furnace, bright anneals large reels and coils of wire.

designed

engineered

and



This furnace bright anneals wire on reels, spools, and coiled. Capacity 4000 lbs. per hr.

Stainless steel wire is bright annealed continuously in these EF multiple tube furnaces.

Specially Built

to meet the WIRE INDUSTRY'S requirements

Charging end of EF special atmosphere bulkhead pusher furnace; bright anneals copper and copper-weld wire and clean anneals brass wire. Capacity 4000 lbs. per hr.

We build production furnaces for heat processing all kinds of wire, rod, or other products — in any shape or form.

Years of practical experience in designing and building successful heat treating equipment enable us to furnish the best type of equipment for any purpose — and to produce the results required.

Shown here are 8 more production installations we made in prominent wire plants. We receive many repeat orders.

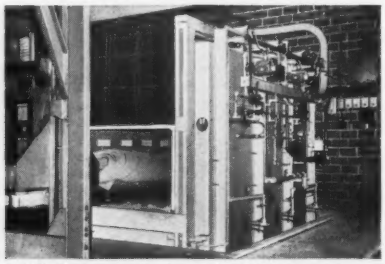
Submit *your* production furnace problems to experienced EF engineers — it pays.

THE ELECTRIC FURNACE CO.

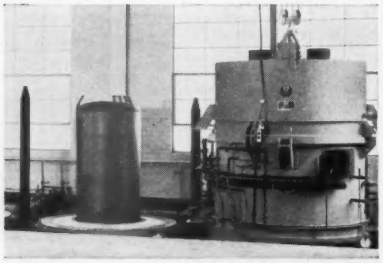
GAS FIRED, OIL FIRED AND ELECTRIC FURNACES FOR ANY PROCESS, PRODUCT OR PRODUCTION

Salem - Ohio

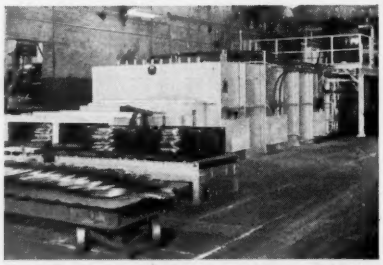
Canadian Associates • CANEFCO LIMITED • Toronto 1, Canada



EF direct gas fired, single end, forced circulation hearth type annealing furnace with gantry crane for handling large coils of cupro nickel wire and brass rod.



EF direct gas fired bell type furnace with retorts and 4 forced circulation bases, used for bright annealing both ferrous and non-ferrous flat coiled wire.



EF special atmosphere continuous bright annealing furnace in which the wire is conveyed through the various zones on two parallel rows of bulkhead type trays.